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The Editor is pleased to consider contributions of interest to the Indian Industry.

Articles should be accompanied by photographs wherever possible and a stamped addressed envelope should be enclosed for return in the event of unsuitability.

Trade notes and short news paragraphs are always welcome.

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Transport in Third Plan

Transport is the barometer of a nation's progress. With Indian Industries attaining gigantism, transport must keep pace with the dynamism in industrial growth. To a huge sub-continent like India to achieve its covetous targets in a span of 14 years is an arduous task. Let us go into the facts of the matter.

Road

With just 83,443 goods vehicles and 34,231 passenger buses in 1951, in 1960 we have 145,387 trucks and 47,905 buses. The committee appointed by the Government of India to report on the progress of the automobile industry in India, recommended many improvements in 1959. The production of commercial vehicles will go up.

With the installation of factories all over the country, roads offer a cheap and efficient way of haulage. Personal service and quick delivery are the watchwords of road transport services. Government has done the right thing in liberalising licences to facillitate more vehicles plying on the road. Truck-trailer combinations are encouraged. For this State Governments are leaving no stone unturned to strengthen weak birdges and culverts on the state highways. Yet it takes time to achieve this difficult task.

National Highways amounting to 13,400 miles have been increased to 15,000 miles. Nearly Rs. 79 crores have been spent since April 1947. And 65 major bridges have been built so far. During First and Second Plans, Rs. 25 crores have been spent for constructing 1,000 miles of new roads and improving 2000 miles of existing roads. The states have for their part spent over Rs. 300 crores for their outlay on roads. In 1947 the total length of road was 2,41,322 miles, made up of 90,630 miles of surfaced roads and 1,50,602 miles of unsurfaced roads. In 1959, it rose to 3,93,000 miles comprising 1,39,000 miles of surfaced roads and 2,54,000 miles of unsurfaced roads. Thus over $1\frac{1}{2}$ lakh miles of road have been added to the arteries of the nation.

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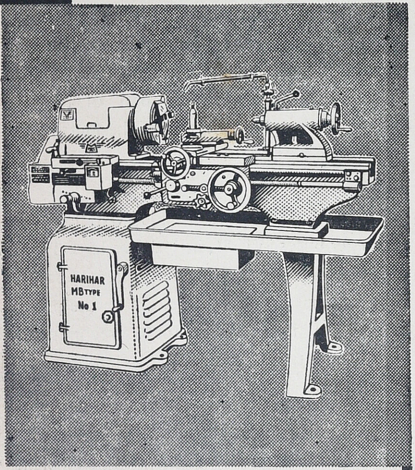

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The Chief Engineers in charge of roads at the Centre and in the States met and after prolonged deliberations prepared a road development plan—a 20-year plan period ending 1980-81. They envisage the rise in mileage from 3.93 lakhs to 6.75 lakhs and of this nearly 40% will be surfaced roads. As a result of this all villages in the country will be within 1.5 miles from a road. This plan involves a total outlay of Rs. 5200 crores.

Inland Waterways

Rivers abound in India. They are names to conjure up visions of prosperity and plenty : Ganga, Brahmaputra, Mahanadi, Godavari, Krishna, Cauvery, Narmade, Tapti etc. They played a great part in the hoary past. They carried men and materials. Even today in states like Bengal, Assam, Andhra and Kerala, water transport plays a prominent part in the economy of the people. With the expansion of Railways and want of care on maintenance, waterways received a setback. Great rivers like Ganga, Brahmaputra and their tributaries, the Godavari, the Krishna and their canals, the Buckingham canal, the Mahanadi canals, and the backwater of Kerala are excellently navigable. The North Indian rivers because of their depth and vastness, play a vital role. But transport is slow. The Gangaputra Water Transport Board is doing distinet services. In the Third Plan Rs. 6 crores are allotted as against Rs. 1.42 crores in the 2nd plan.

Shipping

Indian ships sailed in seas forlorn in remote past. It was the envy of nations in those days. But today the position is tragic. Shipping in India has to start from scratch after Independence. The tonnage stood at 1.25 lakhs in 1945. Considering the magnitude of India's foreign trade and an extensive coastline the committee appointed by the Government of India recommended the attainment of 2 million G.R.T. by 1954. Government accepted this. This was followed by grant of loans on liberal terms for acquisition of ships, the of reservation castal trade to shipping industry, setting up of two shipping corporations in the public sector, construction of ships at Hindustan Shipyard and the sale to Indian Shipping Companies at subsidised prices, maximum allotment of Government owned and controlled cargoes to Indian Ships etc. By the end of First Five Year Plan, Indian tonnage stood at 4,80,000 G.R.T. By 1961 it rose to 9,00,000 G.R.T. on a monetary outlay of Rs. 54.25 crores. In Third Plan Rs. 55 crores are provided for expansion of shipping. By 1966 the tonnage will rise to 1.1 million G.R.T.

Air

Tremendous progress has been achieved during all these years. Ever since the nationalisation of airways in 1953, the progress has been phenomenal. Air.India International operates services to London, New York, Nairobi, Tokyo, Jakarta, Sydney, The Persian Gulf and Moscow (via Tashkent). Thus Indian flights cover the world. There are networks of airlines within the country. The traffic carried by the Indian Airlines Corporation during 1960 was 8.25 lakhs of passengers, 35.6 million kgs. of freight and 6.6 million kgs. of mails as against 2.55 lakhs of passengers, 2.5 million kgs. of freight and 0.64 million kgs. of mails carried in 1947.

During the year 1959–60 Air India International showed a surplus of Rs. 26.98 lakhs while I.A.C. revealed a modest surplus of Rs. 7.81 lakhs for the first time. It was a turning point in I.A.C.'s history. Air India International earned more than Rs. 3 lakhs of foreign exchange in a year.

The operating fleets of Air India International consists of 4 International Boeing 707s and of 9 Superconstellation 1049s. The operation fleet of the Indian Airlines Corporation consists of 54 Dakotas, 5 Skymasters and 10 Viscounts. The question of replacement of Dakotas in the fleet of the I.A.C. is under consideration. The I.A.C., in order to meet the increasing traffic demand particularly on their trunk routes, are negotiating for the purchase of additional Viscounts by disposing of at the same time their 12 Vikings and 7 Herons which were withdrawn from service and are now in storage.

The Air India International entered the 'Jet Age' on the 19th April 1960 by inaugurating their Boeing 707 Inter-continental on the India | U.K. route. The introduction of Jets was soon followed by the extension of their services on the 14th May, 1960 to the U.S.A. The Air India International thus became the first Asian carrier to operate commercial flight across the Atlantic.

In order to increase traffic from India, the Air India International have introduced a Pay Later Plan in collaboration with the Bank of India. This Plan applies to India, Japan, Hongkong, East Africa and Aden. This has become popular and as at the end of October, 1960 a total no. of 618 applications had been approved valued at Rs. 11.80 lakhs.

The Air India International operate similar plans in Germany, U.S.A., U.K., Australia and Greece. They propose to operate a Pay Later Plan in Kuwait and Bahrain.

Since we attained Independenc, the progress we have made on all fronts are very inspiring. But.........

Suggestions

The many points raised by Shri Lalchand Hirachand and Shri T. S. Santhanam in their respective articles are apt to make one pause and think.

Rightly has the Indian Roads and Transport Development Association in a memorandum to the Neogy Committee on transport policy and co-ordination has cautioned that a crisis in transport was brewing and unless steps were taken to remedy the present imbalance in the transportation system, the position was bound to become 'serious'.

The memorandum said that the role of road transport in handling originating traffic (and not feeder traffic only as at present) like the railways should be recognised. The carrying capacities of roads and rail tracks should be based on the principle of maximum utilisation of the country's investment which is expected reach the level of Rs. 900 crores in 1965–66.

The Association has suggested that there should be a road board in charge of the main arterial roads and the traffic on them. The board should be like the Railway board. The development of the two systems should be subject to scrutiny by a co-ordinating board.

The momorandum said that road and rail freight rates should be based on the cost of carriage and not on a graduated scale so that the public might have a yardstick to compare the utility and performance of the two services. Taxation on road transport should be based on service charges, that is, interest on investment in roads, depreciation or sinking fund to recoup it, maintenance of roads and provision for development.

The Association said that the taxation, which was nearly Rs. 2,200 per vehicle, was the highest in the world.

The memorandum opposed the idea of issuing permits on the basis of distances as suggested in the questionnaire, and said that if such permits were issued, vehicles having long distance permits would apply for rebates when they found that they had to ply over short distances during slack seasons.

On the other hand, vehicles plying on short distances would be averse to paying a higher tax when they found that they had to go beyond their limits. Permits, it said, should not be issued on the basis of distances since it would lead to idle capacity during slack season.

Krishna Srinivas

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Low Cost of Vacuum Treatment of Molten Metals

C. G. W. OVERTON, B. Sc. (Eng.)
A.M.I. Mech. E., A.M.I.E.E.

The vacuum melting furance has proved an expensive but useful tool in the production of better alloys and of cleaner metals. Stream de-gassing equipment, alternatively, greatly reduces costs but is only suitable for relatively large batches of metal and has a limited effect on chemical analysis and, therefore, properties. In practice it is limited in use to large forging ingots. Various ladle de-gassing systems are also in use but are limited in the degree of de-gassing that can be obtained in a practical time bearing in mind the difficulty of keeping metal hot in a ladle.

Birlec-Efco (Melting) Ltd. (Sometimes referred to as "BIRLEFCO")* now offer a de-gassing and vacuum refining unit which overcomes many of these criticisms. It is relatively inexpensive but gives close control over temperature and pressure. Turbulence of the metal in the vacuum vessel is induced electromagnetically and therefore cycle times are reasonably short.

New Birlefco Vacuum Refining Unit

A unit of this type has recently been installed at the Birmingham Works of Henry Wiggin and Company Limited for the vacuum refining of special alloys. Basically it is a 15 cwt. Mains Frequency Induction Melting furnace housed in a tiltable vacuum tank.

A water-cooled copper induction coil, which is supported by a magnetically shielded steel framework, forms the furnace proper. Special insulating techniques and careful design work have eliminated the difficulties of handling high voltages in vacuum, ensuring that no troubles arise through electrical breakdowns within the furnace.

The choice of mains frequency was based not only on the lower cost of the mains frequency electrical gear when compared with H. F. equipment but also on the inherently greater degree of turbulence which a Mains Frequency furnace imparts to the molten metal. This turbulence stirs the bath thoroughly and brings new metal to the surface where gases and volatile metals can be drawn off.

The present installation has a rating of 300 kW and is arranged for connection to a low tension three-phase supply. 300 kW gives this unit ample power for melting duty, though, for refining service only, a maximum rating of 200 kW would suffice.

The vacuum tank, which houses the furnace, is mounted on trunnions and tilted by twin hydraulic cyclinders. The tank movement produces an approximately lip-axis pouring effect from the furnace, and a retractable bridge over the top flange of the tank carries the metal stream.

Hydraulic controls open and close the vacuum tank lid and pneumatic clamps lock the lid on to the tank.

The furnace mouth carries a refractory cover and this cover has holes which correspond with a viewing port in the chamber lid. This refractory cover reduces heat losses and cuts down the loss of metal by splashing.

---

* The representatives of Birlec-Efco (Melting) Ltd., in India, are Associated Electrical Industries (India) Private Ltd., 6, Mission Row, Calcutta-1.

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The vacuum pumping lines are connected to the tank concentrically with the tilting trunnion and in this way pumping connections are not demounted when the furnace tilts. The present installation includes a three stage pump set which gives ample gas handling capacity over the whole range. Automatic controls maintain the correct pumping sequence and a dust trap protects the pump set from damage by fumes and metal splashes.

Pirani and dial gauges monitor the furnace pressures.

The whole equipment was designed for use by relatively unskilled personnel with a minimum of technical supervision.

Furnace Operation

A typical vacuum refining cycle occupies about one hour. Liquid metal is brought to the furnace by ladle and, when the furnace is charged, the hydraulic gear lowers the lid into position over the chamber and pneumatic clamps lock it in place. The chamber pressure is then reduced to about 200-300 microns in about 15 minutes.

After vacuum treatment, air is admitted back into the furnace, the hydrulic gear raises the lid and the retractable spout is placed in position. The temperature of the metal is adjusted and checked by dip thermocouple and various other checks are made after which the furnace tilts, pouring the vacuum refined metal into a ladle for casting or teeming in the conventional way.

Results

The application of vacuum to the melt removes gases and volatile metals. The results obtained have proved extremely satisfying and the high temperature properties obtained on vacuum refined metals have exceeded these forecast, basing the estimates on work done in the laboratory. A standard basic refractory lining is in use and gives satisfactory lives. It is rammed around a normal type former and presents no special problems.

The properties obtained on vacuum refined metal are particularly gratifying since they come from a furnace which produces the desired effects at a fraction of the cost of an equivalent conventional vacuum melter. With a reasonable degree of utilisation actual costs are only a few annas per pound of metal treated.

Conclusions

The Mains Frequency de-gassing and vacuum refining furnace can bring practically all the benefits of vacuum melting into the foundry and melting shop at an extremely low capital and operating cost. It provides a tool which gives close control over gas content, chemical composition and metal temperature. This vacuum treatment method involves relatively small changes in an existing melting shop and, since the equipment normally has fully automatic control gear and ample safety interlocks, it does not demand the extensive training of operators.

* * *

The High Pressure Boiler Feed Pump: A Dynamic Evolution in Design

I. J. KARASSIK,
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There can be no question that the boiler feed pump shares the distinction of being one of the most important pieces of equipment in a steam power plant along with the turbo-generator, the boiler and the condenser. It acts as the heart of the power generating system as it pumps the feed water, which is the life blood of the system throughout the system. It is the feed pump that imparts the kinetic and pressure energy to the steam cycle, whose controlled operation permits the whole power generating system to perform its useful function.

No attempt will be made to present a detailed historical survey of every single development which took place in the last three decades. This discussion will be limited to the major changes which have had a profound influence on the design, application and operation of high pressure boiler feed pumps.

By 1926, it became necessary to design and build boiler feed pumps for pressures over 1500 psi. Fortunately, there had taken place major advances in the art of electric motor design and two-pole, 3600 rpm motors were available to drive the pumps. While a certain reluctance first persisted on the part of some users to take the major step from 1800 rpm to 3600, the choice was really not avoidable; either the higher speed was to be accepted or pressure could not be developed to match steam power plant requirements.

The first high pressure boiler feed pumps to be built with a radially split casing were ordered from Worthington by the Boston Edison Co. for the Edgar Station in 1926. The reason for this departure from the formerly accepted practice of splitting the casing along its axial plane was the inadequacy of that design for the higher pressures which were now necessary on boiler feed service.

This first design was a far cry from the modern double casing pump. The individual stage sections and separate suction and discharge heads were held together with large through bolts. Various modifications were introduced between 1926 and 1934 in an attempt to lengthen the periods between required overhauls. But in their essential features, the pumps remained an assembly of bolted-up sections.

The sectionalized design presented a serious problem in dismantling and reassembly, especially since it required that suction and discharge connections be broken each time a pump had to be taken apart. At that time this was unfortunately quite frequent.

True Double–Casing Pump

The true double-casing pump did not emerge as a fully developed design directly to replace the

sectionalized boiler feed pump. The process, instead, was evolutionary. By 1934, Worthington had built a pump with a solid forged steel barrel to which were welded the suction and discharge nozzles. The individual stages were inserted into this barrel and each diffuser was packed against leakage along the casing barrel by rings of packing. This type of construction first made use of the principle which is still incorporated in double-casing boiler feed pumps with a radially split inner assembly, namely that of using the pressure generated by the pump to hold the interstage joints tight against internal leakage. But it still presented assembly and dismantling shortcomings, as each impeller and its diffuser had to be inserted saparately into the solid barrel.

It was a short step from a pressure sealed and packed joint to an assembly bolted together and pressure sealed. This step was taken in 1936 and incorporated into the pumps built by Worthington for the Waterside Station of the Consolidated Edison Co. The inner element of this pump could be assembled externally to the pump itself and inserted into the barrel as a complete unit.

The growth in the number of high pressure boiler feed pumps required for the power industry brought in the appearance of new manufacturers of double-casing pumps. Naturally this led to a variety of new conceptions of design philosophy although the basic concept of a double-casing pump was common to all designs.

Some of the differences are much less significant than they appear at first glance. This is the case, for instance, with the means used in balancing the axial thrust developed by single suction impellers. Two apparently different methods have been selected by pump designers. One method arranges the impellers in sequence, all facing in the same direction. A hydraulic balancing device is located after the last stage impeller. The second method consists of using an even number of impellers, one half of these mounted in the opposite direction to the other half so that the axial thrusts on the two groups of impellers balance each other. But both methods depend on some kind of a balancing device subject to a differential pressure equal to the total pressure generated by the pump.

The total differential pressure has to be broken down in either case. Whether this is accomplished across a single running joint or whether the balancing device is split up into three separate portions distributed throughout the pump and given a different name, is really immaterial. The significant difference is that a true balancing device is so located within the pump that the flow through it is subject to measurement, whereas the "three-part" balancing device does not permit this since leakage occurs internally.

Choice of Materials

Until the early 1940s, there had been very little interest in using materials other than cast steel, forged steel or cast iron for the inner casings of high pressure boiler feed pumps. That this practice did not immediately lead to serious difficulties may be ascribed to the fact that in the early days of high pressure power plant practice, feedwaters carried an appreciable amount of natural salts which acted as buffering elements. But as the trend towards evaportad and treated make-up became more and more general and as the purity of feedwaters grew in importance, the buffering elements disappeared and trouble jobs become more prevalent.

These trouble jobs manifested themselves as "corrosion-erosion" which attacked boiler feed pump casings as well as such pump parts as wearing rings or balancing devices when these were not made of corrosion resisting alloys.

By 1944 this effect had reached such proportions that an investigation was started by the Boiler Auxiliary Sub-Committee of the Prime Movers Committee of the Edison Electric Institute acting in cooperation with a committee appointed by the Hydraulic Institute. The result of the work of these committees was the universal use of chrome steel in high pressure boiler feed pumps. Chrome steel has proven satisfactory over the years and is now considered entirely adequate for the inner casing parts.

Once corrosion-erosion disappeared as a source of damage to boiler feed pump internal parts, the number of operating hours between complete overhauls lengthened measurably. And whereas operators had become accustomed to open feed pumps at regular intervals, the practice soon became established not to open them unless wear had made it justifiable to renew the internal clearance or, of course, unless evidence of accidental internal damage manifested itself.

The evidence at hand indicated that barring accidental interference with the normal life of a pump, today's high pressure boiler feed pump can reasonably be expected to have a life of 100,000 to 150,000 hours before wear makes in necessary to renew internal clearances.

Design Trends

The stuffing box problem had always been an unwelcome thorn in the side of manufacturer and

user alike. Many factors in the service for which these pumps are intended make it difficult to obtain long life for the packing and a life of 12 to 18 months is seldom exceeded. In the meantime, improvements in design and materials have made the modern boiler feed pump capable of operating as much as 100,000 hours or more without internal overhaul. These two time intervals are obviously incompatible and a search for a more adequate solution to the stuffing box problem had attracted a great deal of interest. Two solutions appear to have evolved out of this search: the mechanical seal and the condensate injection sealing.

The principle of the mechanical seal is to provide sealing by having face contact between a stationary face and a rotating face.

Greater experience exists at this moment with condensate injections sealing than with mechanical seals. The reason for this is that at the time it became desirable to eliminate packed stuffing boxes, field experience with mechanical seals was still inconclusive. In addition, no experience whatsoever was available with the application of mechanical seals on boiler feed pumps operating in the speed range of 6000 rpm to 9000 rpm.

Since it was impossible to advance with the development of high speed pumps without first solving the stuffing box problem, the condensate injection construction received the major amount of attention and development.

Principle of Operation

The principle of operation of condensate injection sealing is essentially simple. The stuffing box is replaced by a stationary bushing which forms a close clearance running joint with a shaft sleeve mounted on the pump shaft. Cold condensate is introduced under pressure centrally within the stationary bushing. A small portion of this condensate flows into the pump proper and the remainder flows to a collection chamber and is returned to the condenser.

Field experience with pumps incorporating this construction has been very gratifying. One phase installation that requires special attention with condensate injection sealing is the warm-up piping. Because a definite quantity of cold condensate is constantly flowing into a stationary pump held on standby duty, it is very important to provide an adequate warm-up arrangement, to avoid pump distortion through unequal temperature distribution over the pump casing.

The second of the two latest development is by far the most important. It concerns the "coming of age" of high speed boiler feed pump. The major reasons which favoured the trend towards higher speeds are the following:

1. The higher head-per-stage which can be developed at higher speeds reduces the number of stages and increases the rigidity of the pump. This contributes heavily to the reliability of the equipment.
2. Coincidentally with the reduction in number of stages, higher speeds lead to smaller impeller diameters and therefore to smaller casings. This reduces the stresses which higher operating pressures were threatening to send sky-high.
3. The high speed pump is better matched to the optimum speed of the steam turbine which, as we have seen, is emerging as a formidable competitor to the electric motor.
4. The trend to super-pressure plants and the operation of boiler feed pumps at pressure up to 5500 psi makes it imperative to use higher operating speeds.

The first high-speed, high pressure boiler feed pump was built by Worthington for the Kearny Station of the Public Service Electric & Gas Co. of New Jersey. It went into service late in 1954 and has been in operation since then. It is a 4-stage pump driven by an electric motor through a hydraulic coupling and a step-up gear which brings the pump speed up to 9000 rpm. The pump handles 592,000 lb./hr. of 400 F. feedwater against a discharge pressure of 2720 psig.

Except for a reduction in the number of stages, in impeller diameter and in over-all dimensions, the high speed pump is but a reduced scale model of the line of double-casing pump with radially split inner element.

But the high speed pump requires considerably more NPSH than would be practical to supply by locating the deaerating heater of an open cycle at even the highest possible elevation in the steam power plant. When an open cycle is used therefore, it becomes necessary to provide a low head booster pump, located just ahead of the main feed pump.

Main Advantages

Although at first glance this appears to be an added complication, the booster pump brings certain advantages which more than offset the complication. In the first place, it permits lowering the heater well below its required location for a 3500 rpm installation, since the booster pump is generally

driven by a 1750 rpm motor. Besides the possible savings in structural steel, this re-location of the heater often permits to drain all closed heaters on the discharge side of the feed pump to the deaerator by gravity at all loads. Thus, the booster pump eliminates the high pressure heater drain pumps which have always been of the most sevivce in the power plant. If, on the other hand, no heater drain pumps wese contemplated, and the drains were to be flashed back to the condenser at light loads, the booster pump eliminates the attendant losses. Finally, the use of a booster pump reduces the hazards from transient loads during a sudden load drop.

The high speed boiler feed pump is well on the way to replace the conventional 3600 rpm designs. This evolution of the high pressure boiler feed pump covered about 33 years.

Distinctive Features

1. A barrel type boiler feed pump should first be reliable. After reliability, it should have as many other attributes as possible without impairing that reliability which came first. This is the basic philosophy which dictates the shaft design of all Worthington barrel type boiler feed pumps. It is our intention to produce the shortest and stiffest shaft having the maximum diameter shaft and minimum shaft span possible for the hydraulic conditions desired. There is a direct relationship between shaft rigidity and reliability.

2. In addition to shaft stiffness, liberal clearances at rotating parts also contribute to pump reliability. Obviously, during periods of stress, if amplitude of vibration plus shaft deflection exceeds internal clearances disaster will result. On the other hand, if clearances in rotating parts exceed the sum of amplitude of vibration and shaft deflection disaster will be avoided.

3. In view of the fact that Worthington barrel type boiler feed pumps are built of materials and designed to last 100,000 to 150,000 hours between overhaul, it seems foolish to incorporate internal gaskets having much lesser life. As yet, we have no gasket material which has an expected life equivalent to the life of the basic pump. Therefore, there are no internal gaskets in a Worthington barrel type boiler feed pump and all internal joints are metal-to-metal joints ground and lapped. In addition, hydraulic pressure acts to seal the internal joints.

4. Worthington high pressure boiler feed pumps incorporate machined twin volutes. In this fashion exact duplication is available stage-to-stage, and optimum hydraulic characteristics and performance are insured.

5. Worthington manufactures a high pressure boiler feed pump to last a long time between overhauls. It is built ruggedly for the service intended and consequently all impellers are shrunk on the shaft for a solid design in contrast to a loose rotor construction.

6. When the inner assembly is inserted into the barrel, it is centered and supported at both ends by circular fittings concentrically machined with the barrel bores. The inner assembly is cradled at the discharge end and is bolted only at the suction end. In this manner it is free to expand and contract due to temperature variations without destroying perfect centering joints and bearing supports. Thus the inner assembly is free to expand and contract without introducing thermal stress in any of the pump parts. This feature permits cold start-ups under emergency condition.

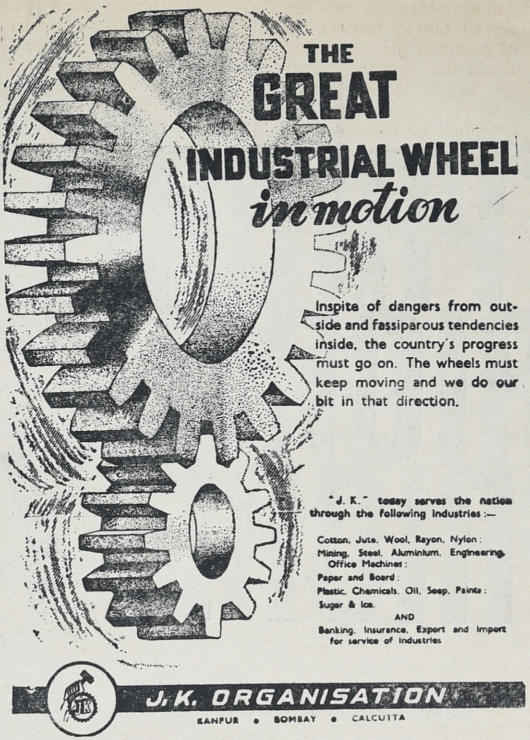
7. High speed construction requires the use of a specifically designed bearing to prevent vibration caused by oil whip. During operation, a specially designed pocket in the upper half of the bearing builds up a pressure pad of, oil. High pressure here creates a downward force on the journal holding it down in the bearing, eliminating vibration caused by oil whips. This type of bearing increases life and cuts bearing maintenance.

8. The Worthington high pressure boiler feed pump is designed for long trouble free service with low maintenance expense. Standardized parts provide maximum interchangeability, permitting substantial reductions in field parts inventory. Barrel type boiler feed pumps with the same barrel sizes use indentical shafts, impellers, diffusers, bearing rings and balancing devices. Custom fitting is eliminated by machining these parts to close tolerance, interchangeability reduces downtime maintenance costs, parts inventories and other engineering problems.

Future Progress

We have come a long way from the sectionalized pump of 1926 which was so complicated to take apart and which had to undergo this process so very often by present day standards. We are now building boiler feed pumps which develop four times the pressures, take twenty times the horsepower and run at five times the speed of the pumps built a short thirty-three years ago. We have solved the problems which faced us then. But as we advance in our steam power technology we create new challenges.

A long as steam power plants continue to supply us with electric power, we will need to build high pressure pumps to feed the boilers. We will find



new problems facing us each time that we make progress in the design of the steam power plant. And the success of the past holds the promise that we will find adequate solutions to solve future problems as they arise.

Tomorrow's high pressure boiler feed pump is certain to be quite different from those in common usage today. There is a definite possibility that the Super Speed pumps operating at speeds of 30,000 or 40,000 rpm will in time find its place in the steam power plant. At this speed a single stage unit could be applied with its simplicity of construction and operation.

The great strides made in aerodynamics in the area of turbulent and laminar flow, boundary layer, and secondary flows in the past few years are being used in hydraulic design. These modern concepts are used in the development of higher leads-per-stage, of inducers, and of energy transformation which will make possible the most efficient pumps at the lowest possible NPSH. Materials of construction will change radically and we will find super hard materials in common usage which will permit the almost infinite life of wearing parts. Lubrication and sealing arrangements will be simplified or eliminated with the use of water lubricated bearings and "canned" rotor construction.

Tomorrow's high pressure boiler feed pump, radical as we may think them to be will progress in the direction of ever-increasing reliability. The day will come when a boiler feed pump can be built tested and welded permanently into the feedwater circuit, without ever requiring to be dismantled for inspection or overhaul. Whether this happens before those of us who have had a hand in the progress achieved to date will have retired is not important. But that it will happen, I believe very firmly.

***

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German Industries

SIEMENS

PIONEERS OF PARTNERSHIP

The name of Siemens is closely connected with electrical engineering for over a century. This is due to the pioneer efforts of Werner von Siemens and his brother—popularly known as Sir William—in the progress and development of electrical engineering.

More than 2,00,000 persons are employed today by the House of Siemens—and they have achieved a lot of development in the entire field of electro-technology. Products ranging from the largest turbine to the smallest transistor set belong to the scope of activity of this working community. Their factories produce electrical equipment worth over Rs. 450 crores annually. This equipment is supplied all over the world.

The supply includes complete power stations with their ancillary equipment, such as generators, switchgear, transformers, cables and overhead transmission lines. It also includes complete electrical equipment for steelworks, rolling mills, textile, paper and other factories—as also for power stations for railway electrification, rolling stock, signalling and overhead lines. Electrical equipment for the shipping industry, as well as lighting and various power equipment for offices and factory buildings are also included.

In the field of telecommunication, Siemens equipment such as wireless transmiters, telephone and telegraphic systems, teleprinters, coaxial cables, etc., is installed all over the world.

To face new problems arising in the field of electrical engineering, more than 10,000 Siemens engineers and scientists are occupied with tasks of serving to promote technical progress mainly. Every employee of Siemens is proud of the contribution made by him to the development of electro-technology.

Siemens in India

Siemens' connection with India dates back to the past century. The first communications link between London and Calcutta was forged by Werner von Siemens, the founder of the organisation, in the years 1867—1870. Even before World War II, the contribution of Siemens towards the electrification of the country was not inconsiderable. Indian independence and the national aspiration for quick industrialisation gave Siemens further scope to serve the nation more effectively and within this decade, Siemens has taken gigantic strides forward in India.

Their long list of contracts includes the power stations of Pathri, Hirakud, Chambal, Durgapur—including extention programme—Mau, Gorakhpur, Sohawal, Khaperkheda, Paras, Korba, Maithon and the power station for the Rourkela steel plant and the

Chole power station. Large high tension switching stations were supplied and installed at Ernakulam, Trichur, Nangal and several other places.

Substantial supplies of electrical equipment were made to all kinds of industrial enterprises in India, such as factories for textiles, sugar, paper and cement industries, etc. The introduction of a new technique for the electrical equipment of ships made a major Indian shipping company decide to instal Siemens equipment in all of their new ships. In the field of telecommunication equipment, considerable orders were carried out by Siemens in the lines of telegraph equipment, coaxial cables, carrier systems and HT telephone equipment.

The marked expansion of the activities of Siemens of India and its policy of developing indigenous facilities wherever possible has led to the formation of Siemens Engineering and Manufacturing Company of India, Priv. Ltd., in April 1957. The new company began its activities in India with offices in Bombay, Calcutta and New Delhi. Later, more offices have been opened in Madras, Bangalore, Ahmedabad, Visakhapatnam, Lucknow, and the latest in the Rourkela. Investigation on site, planning, production, installation, subsequent servicing and repairs... all these facilities for which highly qualified engineers and technicians are employed by Siemens of India, are now available to clients.

In order to help the clients for repairing equipment supplied by Siemens from Germany, a small workshop was established at Worli, Bombay, in 1955. To save foreign exchange—as also to take part in India's rapid industrial progress, it was further decided to increase the activities of the workshop by incorporating its own manufacturing programme. It is now a full-fledged factory, employing more than 400 workers, with a modern design office, manufacturing HT and LT switchgear, switchboards, fuses, railway signals and X-ray equipment. A workshop has been opened in Calcutta for the repair of motors and transformers. By enlarging its activities and by manufacturing and increasing range of electrical equipment, the factory at Worli and the workshop at Calcutta will serve the needs of the growing industries in India.

The one special feature of Siemens in India is that this company—which has manufacturing licences for a wide range of Siemens products—is in turn encouraging independent Indian industries by granting licences and technical know-how to Indian firms—the manufacture of motors and transformers in collaboration with Messrs. Bharat Bijlee Limited, wires & cables with Messrs. Cable Corporation of India Limited, meters with Jaipur Metals and Electricals Limited, radios as with Eastern Electronics Limited. The products thus manufactured are distributed by Siemens throughout India.

Under their training programme Siemens have not only trained several of their employees in their administrative and technical departments in Germany, but have also provided training facilities for the personnel of Government and other industrial organisations.

Over hundred years' experience gained by the House of Siemens in Germany thus contributes to the progress of India's industry as well.

DEMAG

With its projects and deliveries of steelworks equipment and complete integrated plants to numerous countries in the world, DEMAG AG of Duisburg, W-Germany, has made a substantial contribution towards the breaking of new industrial ground, as well as the rationalisation and output expansion of existing industrial plants. DEMAG, with 25 subsidiaries and affiliated companies, looks back to 140 years of experience as one of the world's biggest machine manufacturer.

Everything that an iron and steelworks in the way of mechanical equipment-from bridge cranes for the loading of raw materials to rolling mills-is produced in the DEMAG workshops. Over 1,000 patents have been acquired in the course of past decades, and the experience of industrial construction and expansion from all the continents of the world has been concentrated in this one undertaking. The firm, therefore, is in a position to plan and build metallurgical works from A to Z, independent and from purely objective and economic viewpoints, available, DEMAG can proceed right on up to the handing over of turnkey projects.

One such project was the first Egyptian iron and steelworks at Helwan which was completed in 1958 and was planned for an annual capacity of 265,000 tons of steel. Another instance was when 1,500 designers in Duisburg prepared the plans for the first metallurgical works in South Africa, Burma, in the Philippines, Korea, and for the expansion of already existing works in Japan, Argentina and Brazil, etc. In France, England, Norway and Sweden, existing metallurgical works were expanded, and new plants designed and built.

With regard to the planning of the Rourkela iron and steelworks in India, DEMAG played a leading

part and, together with other large German firms, supplied the equipment required. The hub of the Rourkela rolling mill is the DEMAG-built wide strip mill, the first German-built mill of this type in Asia.

Since the first large-sized crane of 150 tons capacity was built in 1887, DEMAG produced a succession of noteworthy achievements in the field of cranebuilding. Crowning achievement in this line was a gigantic floating luffing crane, 117 meters high, with a capacity of 350 tons. The skylines of important ports in Germany and elsewhere are marked by the enormous DEMAG loading installations. In Narvik, DEMAG built the largest ore-handling facilities on the European continent.

The range of products covered by the general mechanical engineering section of the DEMAG concern comprises excavators, bull-dozers, scraper, road-building machinery, canal-making equipment, portable compressors and many other kinds of pneumatic tools, such as hammer drills, concrete breakers, pile drivers and pile drawers. All these articles are employed not only the building industries, but also in mines, metallurgical works and many other branches of industry.

DEMAG hoists are famous all over the world—so well-known in a fact that they are simply termed "A DEMAG". Similarly, DEMAG compressors are in use in all the countries of the world. For large-scale gas producers, physico-chemical plants, electrolytic plants, gear units, metal industry, ship building industry, research stations, municipal works and transport companies.

DEMAG's most recent affiliate, the INTER-ATOM, in close collaboration with its partner, the North American Aviation, is developing atomic reactors for research and industrial purposes. It has been assigned the task of designing the reactor for the first German atom-powered cargo ship. Its research reactors are to be found in the universities of Berlin and Frankfurt.

The steel construction department with its special plant in Duisburg is the complementing and connecting link in production. It supplies steel structural parts, pithead gears, pithead buildings, blastfurnace, steel and rolling mill bays, storage bays and above all, railway and road bridges of steel. In the case of many bridges built in Germany and abroad, DEMAG was heading construction consortiums and was assigned the task of carrying out the work. As a result of tireless research work, bold incursions were successfully made into new scientific fields; and new designs have been evolved that are truly pioneering for the future.

One proof of DEMAG's acknowledged efficiency in the international field is that DEMAG's bridge building department, in the face of keenest international competition, received the order for 46 bridges under public tenders issued by the Government of Venezuela. Two more orders, one for 15 bridges and one for another 5 followed later.

The creative impulse for new ideas, spelled out in technological progress and rationalisation, is coming from "Centre of Designers"—the heart and brain of DEMAG in Duisburg. There, DEMAG engineers and technicians plan and blueprint plants for customers all over the world. All these technical achievements are only made possible by close and understanding cooperation between the designers and the men in overalls.

Demag in Rourkela

In recognition of future requirements of India's domestic market for high-quality steel products, the Government of India had a wide strip mill built by DEMAG at the Rourkela steel works. (The mill has been commissioned by Prime Minister Nehru in March this year.) The products of this mill will find numerous applications in the processing industries. The Rs. 23-crore plant is distinguished by the favourable cost, perfect finish and close tolerances of the steel strip produced.

Progress of production is completely automatic from the slab to the finished coil or cut sheet. All rolling processes are controlled from a well laid-out control desk. The train consists of eight roll stands. There are two roughing stands and six finishing stands which may be regarded as a finishing train. At increasing speed the material passes from one stand to the next and is rolled down to strips with gauges below 2 mm.

The wide strip mill will produce about 600,000 tons wide strips per year. Since all processes are automatic, few personnel is required. The crew only needs to interfere for control and regulating purposes. A large number of pieces of equipment measuring instruments and signal equipment is switched and checked by the crew in attendance.

The possible applications of the steel sheet produced on the wide strip mill are too varied for enumeration. It is used, for instance, as basic material for the manufacture of boilers, welded tubes, railway locomotives and wagons, etc.

The wide variety of applications for the steel sheet produced at Rourkela at favourable prices is

not only to the advantage of existing processing and consuming industries; many new factories will be founded and steel will be used in products previously employing other materials.

Rourkela is a typical example of the fact that the significance of an iron and steel works for the economy can only be judged from the point of view of its production and the possibility of utilising its products in plants carrying out further processing.

It is DEMAG's President Dr. Hans Reuter with his intense interest in Indian industrial development who is perhaps more than any other man in his company responsible for imbuing the German constructors of Rourkela with a sense for the magnitude of this joint Indo-German undertaking. Dr. Reuter with great vision said:

"Five years ago this area around Rourkela was isolated and untouched by industry. Yet there stands this great industrial undertaking based on the great riches of the Indian soil, utilising its ore, coal and water. Now we can already see in our minds' eye how, in the years to come, hundreds of new industries will arise near and far from this plant. They will live either from processing the products of Rourkela, or from supplying parts and services to the steel plant there, and to the growing population which will earn its living there.

In other words, there in Rourkela will spring up an industrial area that bears analogy to the Ruhr in Germany or to any other industrial district anywhere in the world where steel is made".

KRUPP

Steel makers have swayed epochs and have been courted by Kings. Steel has transformed the methods of warfare as inevitably as astrophysics is doing today. Steel changed the face of the earth. Steel is dynamic.

In the early part of the 19th century, a frenzy of research possessed the pioneers of the German Ruhr. They became the torchbearers of the first industrial revolution; their purpose, the making of steel. Krupp was the name of one of them. In 1811 this man founded his own firm; minting dies were his first product. Today, in the 150th year of existence of Krupps, the company's manufacturing program comprises several thousand items, ranging from all sorts of steel products and a great variety of machines, to trucks, cranes, ships, locomotives and the turn-key installation of complete industrial plants.

Extravagant notions are frequently associated with the name of "Fried. Krupp, Essen"; in reality, the only essential difference between this firm and any other of comparable size lies in its age and in the fact that ever since its foundation, ownership has always been, and still is, in the hands of only one member of the Krupp family. The present sole proprietor is Alfried Krupp von Bohlen und Halbach. His is the fifth generation. The Krupp Concern comprises 22 Works Divisions with their affiliated companies and the Rheinhausen AG, a holding company in which coal mining and steel assets are pooled.

Formerly, the Krupp Concern was centrally managed from the Cast Steel works in Essen. Since 1958, each Works Division has been an independent unit, working in accordance with rules laid down by the Head Office. This new organizational structure resulted from the destruction by bombing and post-war dismantling of the Cast Steel works.

Today, the Krupp Concern employs some 111,000 people and annual turnover exceeds 500 crores D-marks. In 1960, exports accounted for 822 million D-marks and internal sales for 938 million. The annual total production capacity of ingot steel is about 4 million tons and of coal about 5.8 million tons at present.

The reoganization of the Krupp Concern after World war II is now virtually complete. And one major policy change has taken place: Alfried Krupp declared after the war that he did not intend ever to resume the production of weapons of any kind. This statement is still valid, even though products of the Krupp Concern are sometimes sold to military authorities, the Krupp mobile water purifier, for instance, which has frequently rendered valuable service in times of flood disasters and drought.

Krupp in India

The exports of the firm of Fried. Krupp, amounting to almost 25% of the total Krupp turnover, are of considerable importance to the German economy as a whole. The proceeds from the exports of Krupp alone would be sufficient to pay for all of the cocoa, tea, wine and cognac imported into W-Germany. The scope of the Krupp exports thus gives them significance in relation to the world economy as well. They cover all aspects of the Krupp line of production, including plants. A few such projects are particularly noteworthy:

First of all, there is the plant and equipment supplied by Krupp to the Rourkela steel plant. Together with another company, Krupp is the supplier for the Rourkela steelmaking plant, and also supplied the greyiron foundry and the plate rolling mill. Among the larger orders placed with Krupp by India thus far are those for 40 steam locomotives and about 80 special-purpose railway cars, as well as for a shiftable belt conveyor for open-cast lignite mining, two cement factories, and one coke screening plant.

Several low-shaft blast-furnaces were ordered for Southern India. The first unit of this type, with a daily output of 80-100 tons, was set up by Krupp at Barbil, and more are being planned for erection in India and other Asian countries where a similar raw material situation makes the low-shaft blast-furnace the ideal solution to the problem of developing a domestic iron and steel industry.

...in the U.S.A.

Even highly industrialized countries avail themselves of Krupps 150 years of engineering experience which forms the basis for the pioneering work by the firm in so many fields. At a total cost of about 30 million D-marks Krupp built a ship-loading plant for coal in Toledo, Ohio. The plant can load coal from railroad cars into ships at a rate of 6,000 tons per hour, so that the number of lay days required is considerably reduced, resulting in corresponding lower costs. Thus, the coal loading capacity of the Toledo Port has increased by 40%.

The huge plant, which includes a railroad siding with 160 km track, is operated from a central control tower. During a conference in Pittsburgh, leading American materials handling engineers declared, "The ship loading plant designed by Krupp has a capacity which is three times larger than that of any other plant of this type in the world."

...in the USSR

From the Soviet Union, Krupp received orders for several chemical plants. The project comprises the following parts :

One large plant is now being built in a new petroleum-centre of the USSR for processing crude xylene to paraxylene. In another chemical centre of the Soviet Union, the paraxylene will be made into the starting product for synthetic fibres, dimenthylterphthalate (DMT).

In an integrated textile plant, Krupp will provide the facilities for changing the starting products, DMT, into a material that can be spun, and for spinning this material to fibres.

All plants are being erected in the Soviet Union under the supervision of Krupp specialists. Production began this year, at a capacity that is large enough to make up to 500,000 men's suits from the synthetic fibres, depending on the amount of natural fibres mixed in.

...and elsewhere in the world

Krupp played a dominant part in developing Turkey's iron and steel industry. The firm was entrusted with the task of expanding the capacity of the Karabuk iron and steel works from the present 250,000 tons to 600,000 tons annually. When completed, the works will comprise six open-hearth furnaces of 150 tons capacity each. A new blast furnace will also be built in Karabuk. Furthermore, Krupp suplied 6 cement factories to Turkey.

In Egypt, Krupp erected six factories north of Heluan which are the core of a new Egyptian industrial district. They turn out sections and strip of non-ferrous metal. Elsewhere in this country, highlights of Krupp activities are bridges. One of these is a portable bridge for use during emergencies or in disaster areas. In a test, it was found capable of spanning the Nile at a place where this river is 500 metres wide. The swinging-type University Bridge in Cairo was a also built by Krupp, and another Krupp-bridge for automobiles spans the Ismailia Canal.

Krupp planned or is planning iron and steelworks for the Netherlands, Finland, Greece, Iraq, Mexico and other countries. Krupp-Renn plants for the reduction of low-grade, high-grade, high-silica iron ores were built in Greece and Spain. Krupp also supplied rolling mills to Austria and Australia, built wire mills in Austria, Canada, Chile and Peru, and supplied numerous blast-furnaces, open-hearth furnaces, electric-arc furnaces as well as other industrial plants to all parts of the world. Worth mentioning is also a weir plant in Sarobi, Afghanistan, as well as a large crawler-mounted boom stacker and a high-capacity coal handling plant for ship-loading, both supplied to Indonesia.

A number of different countries have requested Krupp to carry out investigations of raw material deposits, which in many cases yielded promising results. Exploratory work of this kind was carried out in such countries as Afghanistan, Burma, Egypt, Ethiopia, Indonesia, Iraq, Liberia, Morocco, the Philippines, Turkey, Thailand and Yemen.

In addition, the firm of Krupp is acting as consultants in many countries, mainly with regard

to iron and steelworks and other large industrial plants.

The products and services offered by Krupp thus extend over a large variety of fields. The nature of Krupps production program is such that it meets with an increasing interest, in particular in the development countries.

MANNESMANN

Tube–Making

The Mannesmann group of enterprises today comprises about hundred undertakings at home and abroad. It has its headquarters in Duesseldorf, W–Germany. But it gives employment to over 80,000 people all over the world.

But what is the Mannesmann Group? Some would answer, "A mining undertaking," thinking chiefly of the enormous quantities of coal, coke and crude steel that Mannesmann produces. Others would answer, "A tubemaking group", well aware that Mannesmann is one of the largest pipe and tube manufacturers in the world. And still others might call it an engineering and processing undertaking, giving precedence in their minds to Mannesmann's real eminence in these fields.

But Mannesmann is not only a mining and steel-making undertaking, not only a tube, nor even only an engineering or processing undertaking, Essentially Mannesmann represents the logical combination of all these kinds of effort; regarded broadly, it is an enterprise in which there is integration vertically of the stages of production which follow one on the other from the extraction of the raw materials and the making of steel, by way of the manufacture of tubes and of tubular products, of plates and sheets and their products, to the construction of whole factories and mills or the sale of the finished article to the final consumer.

In rolling two and two make five

Let us concentrate, however; on the one aspect of Mannesmann activities—tubes and pipes—for which Mannesmann is perhaps best known in the rapidly developing countries in the world.

Pipes and tubes are in use everywhere. They serve both nature and man. Tubes are used for conduction purposes, as beams and as supports. The arteries and the windpipe of the human body, bamboos, hollow bones, straws, reeds, quills—what are they but tubes? Man makes tubes of all sizes and from many substances. But one kind of tube surpasses all other kinds by far in importance:

The steel tube. A strip of steel or a sheet of steel can be bent round so that the ends meet and can be welded together. For a long time this was the only way of making steel tubes. But the seam was the engineer, nightmare; it could not in its early days stand up to heavy stresses. So, long ago it was the dream of every tube manufacturer to produce a seamless tube from a piece of steel.

The brothers Reinhard and Max Mannesmann who came from Remscheid and were born in 1856 and 1861, discovered the secret. As young men they had devoted themselves to devisiug new methods to improve the products of their fathers' file factory. Round iron bars imported from England were the stock from which the files were manufactured. It happened again and again that when a bar was cut to the required length some of the pieces proved to be full of cracks at the core, and consequently, being defective, were thrown to waste. The Mannesmann brothers decided to get the bottom of this irritating phenomenon, and they at last found out that cavities at the core of the round bar were to be found only when, in the course of machining it, rolled in a reeler. In a flash of genius it struck them: How would it be if we intentionally created this "defect" in the course of rolling the steel? Would it not result in a cavity at the core of the piece treated? And then came the idea: Why not try to roll tubes, seamless tubes, in this manner? The idea of the seamless tube was born.

From the birth of the idea to its realization in a practical form was, however, a long and irksome way. But at last their moment came. One night in August 1886 they succeeded in rolling their first seamless tube.

Practically no one believed that the brothers had been successful in producing a seamless tube. If it were possible, then they had succeeded in proving that in rolling two and two make five. It had hitherto been regarded as axiomatic that what is put through a mill is compressed under pressure. But the Mannesmann brothers claimed that the opposite of this proposition was possible, maintaining that they could roll under pressure a cylinder from an ingot of solid steel. That seemed to be the negation of all the laws of physics as then known. And yet it was a fact.

But the fact that a seamless tube could be produced with the help of a reeler did not mean that the brothers' invention had solved the engineering problems. The hollow cylinders produced were short and had thick walls; they were not saleable articles as yet. They were only the beginning of future develop-

ments. So the brothers and their associates worked on indefatigably. Serious financial problems crippled the progress of their experiments, but finally in 1890 they could announce a second complementary invention, that of the process described as the "pilgrims' walk" and known as the Pilger process (Pilger is German for pilgrim).

As in earlier times in the great religious procession at Echternach the pilgrims progressed by taking three steps forward and followed by two steps backwards, so a mandrel moved backwards and forwards while pressing the thick-walled cylinder against two shaping rollers, and this process made it possible to roll out cylinders to tubes of greater length. The seamless tube was no longer a dream. Towards the close of the nineteenth century the seamless tube set out to conquer the world. Thomas Edison, asked at the Chicago World Exhibition in 1893 what he thought was the most important invention, replied without hesitation: "The seamless Mannesmann tube."

.... but the welding engineers are setting the pace

The seamless tube did not remain unassailed by competition for long. Welding engineers exerted all their energies to catch up on the lead that the rolling engineers had established. And they were successful. Today there is for many purposes very little to choose between the welded tube made from steel strip or steel sheets or plates and the seamless tube. Mannesmann has been manufacturing both welded tubes and seamless tubes for many years now.

The processes employed in producing seamless tube have in the meantime been developed and improved. There are other processes available today besides the original Mannesmann Process (reeler and pilgrims' walk). Seamless tube is manufactured now from solid ingots, not by rolling, but by pressing. Power-press extrusion, the latest and quickest process for manufacturing seamless tube, has been installed at the Mannesmann tube work in Witten, W-Germany.

Mannesmann in India

In Rourkela, where the new steel centre built by the W-German industry for Hindustan Steel amidst jungles and rice fields was inauguarated earlier this year, the pipe welding plant built in turn-key fashion by Mannesmann-Meer AG is already producing steel pipes for one year.

Iron, molten from Indian ore with the help of coke from Indian coal, transformed into steel and rolled into broad strip, is the basic material for this ultra-modern, large-diameter pipe manufacturing plant, This plant, to start with, puts India into a position where she can now domestically manufacture the bulk of the steel pipe for the highly important pipeline that will stretch nearly halfway across the entire country from East to West. This project alone, which without the Rourkela pipe plant would have necessitated the importation of finished pipe from abroad, will save the Indian economy enough foreign exchange to amortize the costs of the entire pipe welding plant in Rourkela.

It was a solemn moment, therefore, when the first large-diameter pipe "made in India" and destined for the above purpose was hoisted up by the loading crane from the pipe storage yard in Rourkela and deposited amidst cheers onto the first car of the waiting transport train. And it was not long before the entire train was loaded and departed for Digboi near the Burmese border. This town in the north-eastern corner of the province of Assam is the starting point of the pipeline that is being laid by the Mannesmann-Saipem group and which, over a distance of some 720 miles, will link the rich oil fields in that border area with the projected large refinery at Barauni in the province of Bihar, northwest of Calcutta.

When Rourkela's large-diameter pipe welding plant was completed on schedule (Sept 1960) within a record 15 months, this fact caused veritable sensation. Manufacturing processes in use there are characterised by complete mechanisation and by far-reaching automation, with widest possible use being made of the experiences gathered at the Mannesmann-Meer workshops in M.-Gladbach in Germany.

The successful completion of the Rourkela pipe welding plant, which in two-shift production can manufacture some 200,000 to 380,000 tons of pipe with outside diameters ranging from 8 5/8 to 20 inches yearly, has meanwhile led to new Indian contracts—for two plants for the production of medium-and small-caliber pipes, one in Bombay and one in Ahmedabad. Thus, Mannesmann will continue to participate in the task of India's industrialisation. ****

TRADE WITHOUT TEARS

Metric weights have come into use. Prices are expressed in terms of Metric units. And yet, transactions involve irksome calculations.—Why?

Because the Metric concept is not followed. Commodities are asked for either according to old weight or its equivalents

233 grams — for one pao
454 grams — for a pound
175 grams — for five palams

Either way the advantage of the reform is not realised.

The right way is to ask for

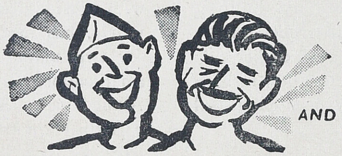
200 or 300 grams
400 or 500 grams
100 or 200 grams

This way we will get full advantage of the reform. Combined with decimal coinage, transactions will be simpler and calculations much easier.

Ask for your requirements in

ROUND **METRIC** UNITS

IT HELPS YOU



AND THE TRADER

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DA 61/100

Instrument Engineers and Technicians

B. D. TOSHNIWAL, M.Sc., (Allahabad) M.Sc., (M.I.T., U.S.A)

Joint Managing Director, M/s Toshniwal Bros. P. Ltd.

In the present age of technology, pattern of Education and Industrial Production is changing very rapidly ; development in one leads to further development in another and vice versa. This process of sympathetic and mutual development has created a wide demand for instruments both in quantity and variety so much so that a realisation has come to thinking minds of the world that progress in Instrument Industry is vital for the overall development of any Nation. Instruments play an effective role in Technical Education, in modern Defence Organisation, in Communication and Transport, besides unhesitatingly being the "Eyes and Brain" of modern Industries. However, the development and production of Instruments is not a simple project because of their vast variety, in addition to the precision technique required in their manufacture. Instrument manufacture technique can only be acquired after years of scientific planning and proper training of personnel.

The problem of proper training of Instrument Engineers and Technicians has received due attention in advanced countries like the United States of America, the U S.S.R., Germany, England and Japan. In our country, the All-India Instrument Manufacturers and Dealers' Association was perhaps the first to realise the importance of these Technicans in the rapidly developing economy of out country, and the attention of the Government on this aspect was drawn in the editorial columns of the IMDA Bulletin. The Association passed a comprehensive resolution on the subject in the Annual Meeting. It is gratifying to note that the Government has responded well to the suggestion and shows its keenness to solve the existing shortage of Instrument Technicians in our country. The shortage already being serious is going to be much more serious during the coming years as our planned industrial economy develops further during the Third and Fourth Five-Year Plans.

Control and Design Engineers

Broadly speaking, we can consider instrument technical personnel in two Categories. To the first category of personnel, we may assign the name of Instrument Control and Design Engineers, who are responsible in the overall planning and design of a new production process. A stage has reached when mechanical and electrical design engineers have to have co-operation from Instrument Control Engineers to put a modern plant into operation. Similarly, a young Engineer may start as a Mechanical, Electrical or Chemical Engineer, but as soon as he takes charge of a Department, he will need a good knowledge of Instrument Control Engineering,

besides his basic specialised engineering knowledge. Such a man must have good knowledge of applied mathematics and physics. The Control Engineer must be trained to consider the system as a whole, whether it be a chemical plant, a mechanical assembly line, a guided missile or any other modern gadget. He must know and study the properties of constituent elements so as to combine the properties of each constituent in a way to produce a whole working in the most efficient and economic way. Control Engineering offers an excellent career for brilliant Engineers and because of their wide knowledge and experience they are likley to be selected to head a particular organisation or a section thereof.

Instrument Technicians

The second category of Instrument Technical Personnel, we may call them Instrument Technicians. These are specialists in different types of Instruments. They serve as Installation Engineers, as Service and Maintenance Engineers, as Plant Operators, as Test Operators for testing either raw materials in finished and semi-finished form. or for checking the quality of final products. Their services are absolutely essential for the successful running of industries.

Evaluation

In order to know the requirement of Instrument Control Engineers and Technicians in India by the end of the Third Five-Year Plan, we have to consider their demand in the following Sectors :

(a) Instrument Industry itself.

(b) Import, Sale, Servicing and Installation of Instruments.

(c) Planning, Designing and Running of various Industries.

(d) Defence, Communication, Meteorological and other Government Departments.

Instrumentation being rather a new conception in India's economy, no statistical data are available on the basis of which correct estimates of requirements of Instrument Control Engineers and Technicians can be made. The best we can do is to make a rough estimate on the basis of personal experience, compare, co-relate with similar data if available in respect to other countries, and then project these figures to arrive at the future requirements.

Instrument Industry

Instrument Industry has made rapid progress during the last few years both in increasing the range of products and also in quality improvement. Two years back, the estimated product was goods worth 1 Crore of Rupees. Now, it can be safely said that goods worth 3 Crores are produced employing about 6,000 people. These figures give an output of Rs. 5,000 worth of Instrument per man, which is an average figure for other industries also in our country. In England, the production figures for 1955 were 80 Crores (£. 60 Million) worth of Instruments by 50,000 people out of which 2,500 were engaged in research and development, giving production per man £ 16,000 worth instruments. This higher production figure may be accounted for by the fact that a number of facilities are available from sub-contractors in England, whereas in India one has to fabricate many things himself, because of the lack of outside facilities. Out of 6,000 people employed in this industry at present, we may estimate that there are 200 Control and Design Engineers, 1,000 Technicians and the rest craftsmen.

Towards the end of the Third Five-Year Plan, the total requirement of Instruments has been estimated at Rs. 40 crores per annum and a suggested production target of Rs. 25 crores worth of Instruments yearly by the writer in an article published in IMDA Bulletin, November 1959 issue. These figures are within the realm of reality because the Development Council for Instruments has also proposed a target production of Rs. 20 crores by this period. Assuming the existing employment ratio, to achieve this production target of Rs. 25 crores worth of Instruments we are likely to require 1,600 Instrument Control and Design Engineers and 8,000 Instrument Technicians by the year 1966.

Requirement for Sales Servicing

The present estimated import of Rs. 13 crores worth of Instruments seems to be a correct figure in view of the latest figures published by the Instrument Industry and Organisation of Great Britain. According to their information, Instruments worth £ 2,735,626, or Rs. 3.54 crores were exported to India during the period January to November 1959 by England alone. The other major tradition Instruments supplying countries are U.S.A., West Germany, Switzerland and Holland; Recently, a number of Communist countries have arranged to supply a large number of Instruments in rupee account. The Perspective Division of Planning Commission has estimated that during the year 1957 industrial instruments worth Rs. 4 crores were imported. Since then, the import has increased further. Leaving Oil Refinery Plant where the cost of Instruments is of a high proportion, being 8 to 10% of the total cost, in other countries, the cost of the Instruments

is of the order of 2% average, the total import is roughly distributed as under :

(a) Through Established Importers and State Trading Corp.	6 crores
(b) Through various Government Departments to meet the requirement of Defence, Communication, Meteorological etc.	3 crores
(c) Through various Industrial Organisations along with Capital Equipment	4 crores
	13 crores

A general survey shows that in the various sales and service organisations about 200 Instrument Control Engineers and about 400 Instrument Technicians are employed at the moment. Estimating no major increase to take place in imported Instruments so as to limit the import to Rs. 15 crores worth of Instruments (This can only be done by stopping completely the import of simple Instruments and diverting the available foreign exchange to only those essential Instruments which are not likely to be manufactured in 1966), we feel that the employment pattern in this sector will be about 400 Control Engineers and about 1,000 Instrument Technicians, assuming that the present dealers will handle the sale of locally manufactured Instruments in increased proportion and will also organise better servicing facilities.

Requirement of Government Organisations

The requirement of Instrument personnel in various Government Departments is somewhat more difficult to estimate than in other cases. We can only say that they will be required in increasing numbers because of Automation, in Defence Organisation, Communication and other services. A large number of Instruments are likely to be employed in various Atomic Energy Establishments where everything has to be handled by remote control. The extent to which Atomic Energy Work and establishment of Atomic Power Generation will be carried out is to be decided by the Government. It may, however, be assumed that at present about 500 Instrument Control Engineers and 1,000 Instrument Technicians are being employed in various Government Departments and the figure may rise to 1,000 and 5,000 respectively by 1966.

Requirement of other industries

Finally coming to the requirement of Control Engineers and Instrument Technicians in various Industries, we have the following figures available for our consideration.

In the United States of America, out of 2,00,000,000 persons employed in various manufacturing industries, there are 40,000 Control Engineers and 200,000 Instrument Technicians. On this basis, in England, where about 1,00,000,000 people are employed in manufacturing industries, it is being planned to have 20,000 Control Engineers and 100,000 Instrument Technicians. In India, we cannot and should not expect the same proportion of Control Engineers and Technicians in our various industries for the reason that with a large unemployed population we will either not resort to automation or instrument utilisation as in U.S.A. or U.K. In those countries, employment is near saturation limit. But there is no denying the fact that there is a gradual tendency all over the world and even in our country to employ more and more skilled technical personnel in industries. We cannot ignore this tendency, if we have to make quality products at economical price and which is also competitive in the world market; otherwise, our export trade would suffer tremendously.

According to the latest figures available during the year 1956–57, the number of total employed people in India was 1,43,00,000. This figure does not include people in the agricultural occupation which is the mainstay of our economy. Out of this number about 34,40,000 *i.e.* 24% were employed in manufacturing industries. It is further estimated that the present employment of people in manufacturing industries has gone up to about 40,00,000 and is likely to go up to 50,00,000 by the end of the Third Five-Year Plan.

Thus from the above figures we learn that for each Control Engineer there are 5 Instrument Technicians, and secondly that for each 5,000 workers in manufacturing industries in advance countries there are 10 Control Engineers. In our country we may figure that at the moment we need one control

engineer for every 5,000 persons employed in manufacturing industries and plan to double this figure by 1966, because even then the percentage of Control Engineers in our industries will be only one-fifth of those in advanced countries. Based on these considerations we come to the following summary :

Summary

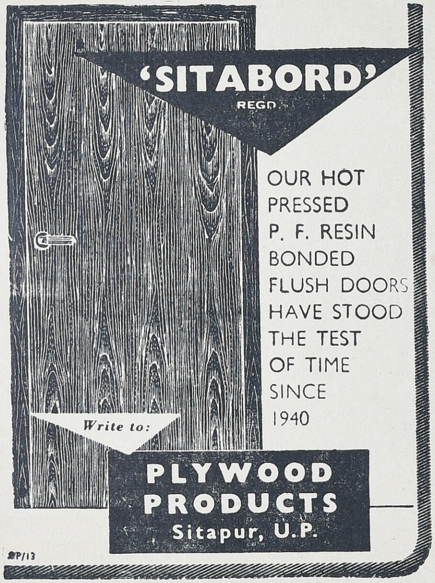
Tabulating all the above estimates together, we come to the following figures :

	Control Engineers		Instruments Technicians	
	Now	1966	Now	1966
Instrument Industry	200	1,600	1,000	8,000
Instrument Sales & Service	200	400	400	1,000
Govt. Departments	500	1,000	2,500	5,000
Other Industries	800	2,000	4,000	10,000
	1,700	5,000	7,900	24,000

Recommendations

Thus by 1966, our country will need about 5,000 Control Engineers and 24,000 Instrument Technicians. Taking 35 years as an average expected active life of these people, our Educational System should be geared to produce about 150 Control Engineers and about 700 Instrument Technicians every year. The detailed courses of instruction for the training of these persons can very well be left in the hands of an Expert Body consisting of Technical Educationists and Industrialists.

For the development of Instrument Industry, besides Control Engineers and Instrument Technicians, we also need a large number of Craftsmen. Various Government Training Centres are carrying out excellent job in training such people, but it is felt that the period of training which is now limited to 18 months is rather too short. To train a Craftsman for Instrument Industry, a minimum training period of at least 3 years is essential in various specialised jobs such as Draughtsmanship, Fitters, Turners, Foundry, Painting and Finishing etc. Of course, it will be in the interest of established instrument industries also to start suitable apprenticeship courses in their own set-up existing today. ***



Soviet-Indian Economic Co-operation

V. BOLSHAKOV

Expert, State Committee of the USSR Council of Ministers for External Economic Relations

Soviet Aid for Six Projects

The agreement on further economic co-operation between the Soviet Union and India signed on February 21, 1961 at New Delhi highlights the fact that the Soviet Union is co-operating to an ever greater extent in building India's independent economy.

Under the terms of the agreement, six projects—mainly power development and the production of oil—are to be financed by the last Soviet credit of Rs. 60 crores for the Third Five-Year Plan.

The projects covered by this agreement are a 480,000 kw hydropower station at the right bank of the Bhakra with four 120,000 kw turbines; an oil refinery in Gujerat which will process two million tons of crude oil into fuel per year, together with a power station for the refinery; a coking coal dressing plant with an annual capacity of three million tons of coal in Bihar; a refractories plant near Bhilai with an annual capacity of some 125,000 tons of magnesite and fire-clay products; the prospecting and extraction of oil and gas by the State Oil and Gas Commission in Cambay, Ankleshwar and other places, as well as the drawing-up of a technical-economic report for building a compressor and pump engineering works.

Soviet organisations will elaborate the technical designs and blueprints required for building the above enterprises, will supply plant, machines, spare parts and other materials, and will also render technical assistance in building the above enterprises and in putting them in operation.

All-Round Technical Assistance

This agreement, which covers all-round technical assistance in building these six major projects, like the previous agreements, is of great importance for India's industrialisation and the fulfilment of her Third Five-Year Plan.

The Soviet Union, while fulfilling its Seven-Year Economic Development Plan, which envisages a sharp upsurge in the national economy, has the opportunity of allocating ever-increasing material resources for rendering technical assistance to countries which have taken the road of independent development. It is notable that the new credits provided by the Soviet

Government to the Indian Government are a result of the fact that the Soviet Union has exceeded the targets of the Seven-Year Plan.

Ever since they won independence, the people of India have been exerting great efforts in developing the country's productive forces and in the first place, heavy industry in the public sector.

During the first two five-year plans, India consolidated her industry and made an important step forward along the road of industrialisation. In the Third Five-Year Plan still greater importance is attached to the country's industrialisation.

As early as 1959 when the draft of the Third Five-Year Plan was very far from being ready, the Government of the Soviet Union, meeting the wishes of the Indian Government, agreed to render technical assistance in setting up a number of enterprises and to provide 180 crore rupees in credits for this purpose. In February 1960, during the visit of N. S. Khrushchov, Chairman of the USSR Council of Ministers, to India, an agreement was signed determining the list of enterprises to be set up with these credits.

In July 1960 during the visit of Mr. Morarji Desai, India's Finance Minister, to the Soviet Union, the USSR Government agreed to provide India with an additional credit of approximately 60 crore rupees. Today the agreement on this credit has been concluded and the list of enterprises and projects to be built with the particiation of the Soviet Union using this credit for this purpose specified.

Basic Trends

What are the basic trends of the economic and technical co-operation of India and the Soviet Union in the Third Five Year Plan period ?

At present the erection of the Bhilai iron and steel plant with an annual capacity of one million tons of steel has been completed. During the Third Five-Year Plan period the capacity of the Bhilail plant will be increased to 2.5 million tons of steel a year and will account for 25 per cent of all the steel smelt in the country.

The Government of India is taking energetic measures to set up a national oil extracting industry, in the development of which Indian-Soviet co-operation acquires ever-increasing importance. It is generally known that with the assistance of specialists from the Soviet Union and with the help of equipment supplied by the USSR, commercial oil deposits were found in Cambay, Ankleswar and Rudrasagar. The Industrial development of the discovered deposits is at present being started while the work of prospecting will be increased.

Two oil refineries will be built with the Soviet Union's assistance, each having a capacity of two million tons : one in Barauni, the other in Gujerat.

The erection of India's largest thermal electric station with a capacity of 400,000 kw., is being carried out in Neiveli. Two other thermal power stations will be built in Korbe and Singrauli and a 480,000 kw hydropower station on the right bank in Bhakra. The total capacity of these electric stations will account for more than 30 per cent of all the capacities to be erected during the Third-Five-Year Plan period.

Machine-Building

The development of machine building, especially heavy machine building, occupies an important place in the Third Five-Year Plan. The Soviet Union is already rendering assistance in erecting heavy machine-building and mine-equipment plants, a plant for heavy electrical equipment and a precision instruments plant. In accordance with the new agreement, the USSR will assist in the designing and erection of a plant manufacturing compressors and pumps.

The Soviet Union is besides rendering technical assistance in developing India's coal industry, in building pharmaceutical plants and other projects.

The Soviet people view with great satisfaction the successful development of econmic co-operation between our countries. They know that this co-operation, based on principles of mutual trust, friendship and respect for each other, serves not only the interests of the peoples of both countries, but the interests of world peace as well.

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Japan Aids India

Spiritual and cultural ties based on Buddhism have bound Japan to India for many centuries. After a long struggle, India finally gained political independence in 1947. Japan concluded a Peace Treaty with India in 1956, thereby normalising relations with the new sovereign state. Their relationship, economic, political and cultural, has steadily grown closer ever since.

The two countries signed an Agreement for Air Services in 1955 and a Cultural Agreement in 1956. This was followed by a visit to India by the Japanese Prime Minister, Mr. Nobusuke Kishi, and the return visit to Japan by the Indian Prime Minister, Mr. Jawaharlal Nehru, in 1957. An even more illustrious chapter in the history of Japan-India relations was opened by these visits.

In 1958, the two countries signed an agreement on commerce and an agreement on Japan' extension of $ 50 million on loan to India. In 1960, an accord on the prevention of double taxation was concluded, followed by an agreement on the establishment of a prototype production and training centre for small scale industries. In August 1961, an agreement was concluded for a $ 80 million loan from Japan to India.

Exchange Of Visits

Many top leaders of India, in addition to Mr. Nehru, visited Japan one after the other. A hearty welcome was extended by the Government and people of Japan to the Vice-President, Dr. S. Radhakrishnan, in 1956 and to the President, Dr. Rajendra Prasad, in 1958. Also invited to Japan as Government guests were the Finance Minister, Mr. Morarji Desai, in 1959, and the Chief Justice, Mr. B. P. Sinha, in 1960.

In return, His Imperial Highness Crown Prince Akihito, accompanied by his Consort, Her Imperial Highness Princess Michiko, visited India as Proxy of His Imperial Majesty the Emperor of Japan in November 1960. The warm welcome they received from both the Government and people of India during their stay deeply impressed the Japanese people.

Economic Relations

Economic relations between Japan and India have been expanding on a solid and stable basis. While Japan's exports to India came to a temporary standstill after reaching their peak of $ 144 million in 1957, they recovered upto the $ 112-million-mark in 1960, aided by the progress of economic cooperation between the two countries.

Japan's import from India also dropped to $ 54 million in 1958 after reaching a postwar record

of $ 58 million in 1957. But since then, Japan's import has been rising rapidly, soaring upto $ 72 million in 1960.

Even in the most unfavourable year of 1958, the two-way trade surpassed the $ 150 million mark, thereby proving that Japan and India are important to each other as markets. In 1960, India ranked ninth as an importer from Japan and eleventh as an exporter to Japan. On the other hand, Japan was the third largest buyer of Indian products and the fourth biggest supplier to India.

Balance of Trade

Japan's exports to India consist mainly of metals, metal products and machinery, with the first and second items representing 52 per cent and the third item representing 29 per cent of the entire volume of export to India in 1960. This is in sharp contrast to the situation which had existed uptil the early fifties and other consumer goods had been Japan's main export items. It reflects a shift in India's domestic demand caused by the progress of her economic development programme, and it also means that Japan has become an important supplier of industrial goods indispensable for a new India.

India's export in Japan, on the other hand, are made up primarily of raw materials for industrial use such as iron ore, scrap iron and raw cotton. In 1960, for instance, they took up 40 per cent, 15 per cent and 16 per cent, respectively of India's total export to Japan. Since Japan is deficient in natural resources, she must secure a steady supply of essential raw materials in order to carry out her policy for a high rate of economic growth. It is, therefore, expected that Japan's dependence on import from India will become ever greater as the years go by.

Japan has maintained a slightly favourable position with the exception of 1959 in the balance of trade between the two countries in the past five years. Inasmuch as the balance had tipped heavily in favour of India until 1954, the recent trend can be said to be a complete about-face. With 1954 as the departing line, India's import from Japan doubled, while her shipments to Japan failed to expand.

The sudden reversal in the trade balance has stemmed from the enormous growth of India's domestic demand following rapid progress in the economic development programme. To enable India to pay for her greatly increased import, again, Japan has extended to India sizable loans for economic development.

Economic Aid

Apart from the $ 50 million loan extended in 1958, Japan, as a member of the Consortium of Governments and Institutions interested in development assistance to India, made her first extension of a $ 10 million credit to India in 1958 and her second extension of credit of an equal amount in 1959. In 1961, an additional $ 11 million credit was given.

In the successive years of 1959 and 1960, Japan pledged to extend loans of $ 8 million and $ 21 million to India to develop, for export purpose, her iron ore mines at Rourkela and Bailadila respectively. In May this year, Japan again pledged to grant a $ 80 million loan to cover the first two years of India's Third Five-Year Plan, as a member of the Washington Consortium.

The trade between the two countries is assured of a bright future of mutual expansion supported by large-scale economic development schemes underway in both countries. Aside from the financial aid, Japan has furthermore promised to buy from India iron ore in vast quantities. When this iron ore begins to arrive in Japan in the not-too-distant future, her imports from India will zoom. In the face of this situation, it is strongly hoped that India's imports from Japan will be correspondingly increased. Any such increase should not be limited to items directly linked with the development capital supplied by Japan, otherwise an abnormal situation would arise, where trade expansion would be brought about by Japan's financing alone. Accordingly, in order that commerce between the two countries may develop on a normal, balanced pattern, it is important that efforts be made on the part of India to expand her imports on a private commercial basis.

Technical Collaboration

In the field of technical assistance, the agreement on the establishment of a prototype production and training centre for small-scale industries in the outskrits of Calcutta was signed on 1960. Buildings and other facilities of the Centre are under construction and the centre is scheduled to be in full operation in the first half of 1962.

This agreement will be followed by negotiations on the establishment of an agricultural demonstration-cum-training centre and a marine products processing training centre. It is hoped that the technical as well as institutional achievements in the fields of agriculture and fishery in Japan will be shared by the Indian people and thus contribute to their prosperity.

Through the Colombo Plan, Japan has contributed a great deal towards the economic development programmes of India. More than 130 Indians went to Japan for a variety of training and about 40 Japanese technical experts came to India for teaching at the various Indian institutions.

Remarkable progress has been made in the private sphere of economic co-operation. As of today, a total of 47 cases of joint Japan-India business enterprises and technical collaboration are under way. Outstanding among the Japan-India joint enterprises are Pilot Foundation Pen, Taiyo Fisheries, Asahi Glass and Sekisul Chemicals. Notable among the technical collaboration projects are those for the manufacture of integrating wattmeters, batteries, insulator, electric wires, tranformers and watches. ***

Export—Import—Co-operation

MILAN DUBSKY

The Czechoslovak Chamber of Commerce

Before the second World War Czechoslovakia was not yet in a position to compete in the per capita production with highly industrialized countries. The only exceptions were traditionally exported consumers' goods such as shoes, woollen fabrics, glass, artificial jewellery, sugar and malt, where the index approached —and sometimes even surpassed— the highly industrialized countries.

But after the second World War the industrial structure of the Czechoslovak Socialist Republic was rebuilt according to plan to correspond to the needs of the national economy and the engineering industry occupied the first place. During the period 1948–1959 the overall industrial production of Czechoslovakia increased 3.3 times, the engineering production 5.8 times. A number of engineering factories with century old traditions, such as the Skoda Works of Plzen, the Prvni Brnenska strojirna, CKD Praha, Kralovopolska strojirna of Brno became famous by their products all over the world.

In many fields of engineering Czechoslovakia is today getting into the world lead. In the per capita production of machine tools she is only behind the USA and Switzerland, in the production of steam turbines behind the USA, the GFR and Switzerland. In the production of certain engineering products of a consumers' goods character, such as for example of household washing machines and motorcycles she is even first in the world and in the production of agricultural machinery she is on the level of the highly industrialized Western countries.

Export of complete factories

Tradition of many years standing and the high technical standard of the Czechoslovak engineering industry create favourable conditions not only for the export of machines, but they also permit to project, supply and assemble complete industrial plants abroad. In the year 1937 the share of the export of machines and plant in the total exports of Czechoslovakia was only 6.4%. In the year 1959 it was already 44%. In the years 1948–1959 Czechoslovak exports of machines and plant increased by almost 400%. (The exports of engineering products from capitalist countries during the same period increased only by 162%).

The export of complete industrial plants rises even faster. In the year 1960 it attained almost 29 times the volume of the year 1948. What kind of industrial plants are exported from Czechoslovakia? Primarily sugar mills, alcohol distilleries and plant for metallurgy and power production. But Czechoslovakia exports abroad and overseas also complete metallurgical works and power plants, machinery for the production of building materials (particularly cement works and ceramic ware factories), plant for the chemical and petroleum industry, engineering works and rubber factories, tyre factories and woodworking machinery. The exports of plant for cement works alone increased by 221% in the years 1955–1959, although it is a new branch of Czechoslovak exports.

550 complete industrial plants all over the world

That is how many complete industrial plants the Czechoslovak foreign trade organisation TECHNO-

EXPORT has delivered to countries of all the continents. Among the most significant are the building of the engineering metallurgy works at Ranchi in India, which includes a foundry shop, a forge shop and rough machining shop (including a power plant) and the delivery of plant for the hydero-electric power plant Bariri with an output of 142 MW.

A crude oil refinery with a capacity of 1 million tons annually, built by the Czechoslovak Socialist Republic is in operation at Homs, in the Syrian region of the United Arab Republic. Technoexport delivers to Argentina electrical plant for the building of the thermal power Plant Yaciminetos Carboniteros Fiscales at Rio Turbio, for Nueva Fabrica Militar de Vainasay Productores at Lavallol and for the province San Luis. At the present time the assembly of the plant of a cement works with a capacity of 200 tons in 24 hours is under way in India.

Export without conditions

Czechoslovak industry also offers a number of technical services and aid in goelogical prospecting, in drafting the projects of various industrial plant and aid in their assembly, in the enlargement and modernization of older plant. The rapidly growing exportation of complete industrial plants proves, that Czechoslovakia is able to offer effective cooperation to economically developing countries in the building up of their national economy. Czechoslovak deliveries are offered under mutually advantageous conditions and the Czechoslovak Socialist Republic does not attach any other conditions to her deliveries. Czechoslovakia has offered to a number of countries, such as Brazil, Ethiopia, Cuba, Ghana, Afghanistan, India, Indonesia, Ceylon, the United Arab Republic, Iraq and others, credits for the building of their own Industrial plants.

The Czechoslovak Socialist Republic does not found her own companies abroad nor does she participate in them financially. Therefore she does not drain the profits from newly built enterprises in those countries, nor does she influence their economy. Besides this Czechoslovakia accepts the payment of Czechoslovak deliveries of complete industrial plants by the traditional export products of these countries.

The broad and ever wider assortment of Czechoslovak engineering products and plant also contains microturbines, boilers, complete thermal and hyderelectric power plants, steam and gas turbine mobile power plants. Further plant for power plants, for the metallurgical and foundry industry including rolling mills, for the chemical and petroleum industry, for beet and cane sugar mills, alcohol distilleries, beer breweries, malt-houses, canning and bottling plants and plant for the production of building materials.

In her participation in the building up of the industrial potential of countries which are developing economically, Czechoslovakia sees her contribution to the peaceful economic co-operation of all countries of the world.

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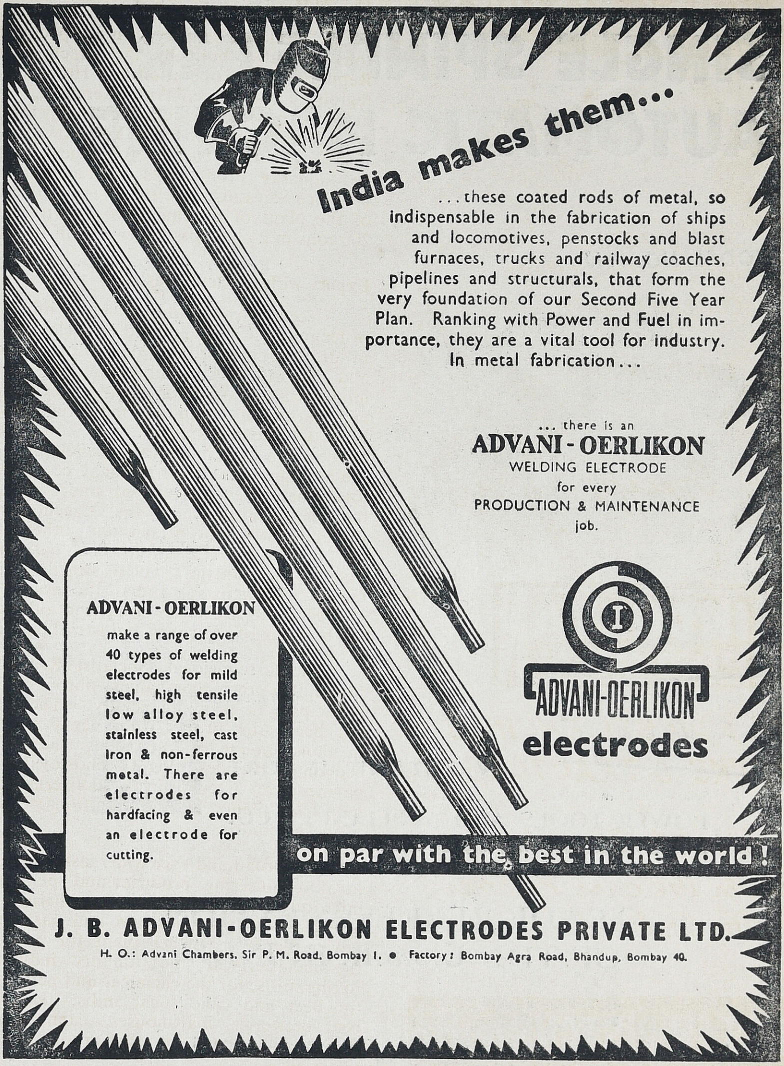
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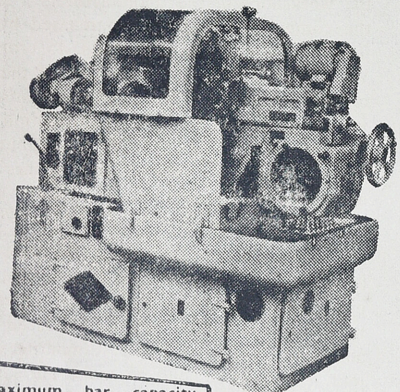

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Automobile Industry

LALCHAND HIRACHAND
President, Association of Indian Automobile Manufacturers

A review of the progress and development of the Automobile Industry over a period of 7 years, i.e. since the establishment of the indigenous industry on a firm footing by the Government after the Tariff Commission's Report of 1953 will not be out of place at this stage. Some of the vital statistics pertaining to and arising out of the progress of the Industry are displayed by graphs and charts around this hall. The production of vehicles has increased from about 14,000 in 1954 to 52,115 in 1960. The block investment in the Industry has increased eightfold over this period. The number of persons employed by the main manufacturers has increased from about 5,000 to about 35,000. The salaries and wage bills of the manufacturers have gone up eight times and about Rs. 10 crores were paid out as wages/salaries in the year 1960. More than 1300 apprentices are undergoing training every year in the workshops of the manufacturers. The value of the components and parts purchased by the manufacturers stands now at over Rs. 15 crores per year. Whilst the Industry's contribution of the Exchequers of the Central and State Governments was about Rs. 2 crores in 1954, the contribution in 1960 is reckoned at over Rs. 16 crores. Though the indigenous content of vehicles and engines varies from manufacturer to manufacturer, majority of these have an indigenous content of well over 70 per cent.

Coming now to the cost of the Indian vehicle, it is admitted that the manufacturing cost as well as prices for the various makes and types are higher than those for similar vehicles produced in the more advanced countries. Expert Committees have opined that it will be difficult to make an equitable comparison of Indian prices with overseas prices. Some of the distorted ideas on the subject of costs and prices of Indian vehicle have been disproved in the Report of the Ad Hoc Committee on Automobile Industry. The restricted volume of production is the primary reason for the high cost of production in India. The production of motor vehicles in the U.S.A. is over 150 times that of India. If we restrict the comparison to motor cars only, the disparity assumes mountainous proportions. In the year 1960, U.S.A. produced 335 times the number of cars produced in India. Even the production in U.K. is 30 times that of India. The relation between the quantity of output and cost of production is more pronounced in the case of the Automobile Industry than in a majority of other Industries. Automobile Manufacturers in India can ill-afford to equip their factories with the specialised machinery capable of the most economic production on a mass volume basis. Huge outlays on capital equipment

and consequent payment on foreign exchange for mass production machinery are not warranted or justified by the current or expected levels of demand for motor vehicles. It is also significant to point out that many of the imported raw materials are available to the automobile producer at prices higher than those paid by his counterpart abroad. Despite these handicaps a number of automobile manufacturers effected a reduction in their prices during the last year but unfortunately these reductions were nullified by the imposition of very heavy excise duty. From the buyer's point of view, the incidence of Government duties is acknowledged to be the heaviest in India and as stated earlier, the Industry contributed over Rs. 16 crores to the Government Exchequer in the year 1960.

I shall now review the production in the years 1959 and 1960. The production of automobiles has increased from 36,368 in the year 1959 to 52,115 in the year 1960. The production of diesel engines increased from 8,607 in 1959 to 10,566 in 1960. There was a phenomenal increase of over one hundred per cent in the case of motor cycles, scooters and three-wheelers. The output in 1960 was of the order of 17,374 as against 8,126 in the year 1959. The overall production for the year 1960 was 56 per cent more than the overall production in the year 1959. Without taking into consideration the two and three-wheeler vehicles, automobile production increased by 43 per cent in 1960 over the figure of 1959. This increase in production has been achieved with little or no increase in the allocatlon of foreign exchange for the industry during the corresponding periods. The increase of production, in other words, reflects the extent of increase in the indigenous content of the vehicles and I trust that you will agree with me when I say that the industry deserves to be congratulated for the present high rate of production. These facts should dispel the doubts existing, if any, in the minds of the public regarding the sustained progress of the industry and the rapidly increasing utilisation of indigenous materials, components and labour.

It has been rightly said that India is on the threshold of the automobile age. The motor vehicle is now recognised as a necessity rather than a luxury. Efficient and economic road transport is the yardstick by which a country's economic progress and development can be measured. Road Transport is faster and more economical than any other mode of transport. Its employment potential is higher than that of any other industry of such a magnitude, In the wake of our country's successive Five-Year Plans, India's transport requirements have already increased and will further increase enormously. The time has, therefore, come for the Automobile Industry to occupy a pride of place in the national economy as it does in the other advanced countries of the world.

While on the subject of road transport requirements of the Third Five Year Plan, I should make a reference to the Planning Commission's Committee on Transport Policy and Co-ordination, popularly known as the Neogy Committee, which submitted its preliminary report to the Planning Commission in February, 1961. The Committee does not appear to have come to grips with the problems it had set about to tackle. It has not made any specific recommendation in regard to co-ordination of transport or the formulation of a national transport policy. The report is more in the nature of a study or a thesis and ends up with a questionnaire to solicit comments from the general public and the specialists in the field of transportation.

The Report of the Ad Hoc Committee on Automobile Industry published in January, 1960 is the result of an exhaustive study and gives a general picture of matters relating to the development of the industry. An important recommendation of the Ad Hoc Committee is that any new automobile project should receive secondary consideration if it impinges on the foreign exchange resources of the country. I trust it will be borne in mind while deciding the future policy by the Government. That Committee had also recommended that no fresh dutes should be imposed on this infant Industry. Unfortunately, however, within a few weeks of the publication of the Report and Recommendations, heavy impositions by way of excise duties on motor vehicles were introduced by the Government in the Ministry of Finance. While the public at large and this Industry in particular recognise the need to tap all sources of revenue for meeting the increasing expenditure for the successful working of the country's Plans for economic advancement, the Industry was generally of the opinion that the impositions by way of excise duties in the year 1960 was of a high magnitude. The Industry had fervently hoped, probably with a certain amount of justification, that the excise and customs net of the current year. i.e. 1961, will exclude from its purview the automobile and connected industries. Unfortunately, the Finance Bill 1961 envisages certain enhanced rates, new levels and countervailing import duties which will inevitably increase manufacturing costs of motor vehicles and engines and possibly necessitate an approach to the Government for increases in selling prices. Until such time as it is practicable for the automobile industry to secure all

its iron and steel casting, steel forgings and steel pressings indigenously and to discontinue the import of machinery which are not now available from Indian sources of supply, the proposal to increase the duty on iron and steel manufactures from 35 per cent to 50 per cent and the duty on machinery from 10 per cent to 15 per cent will result in an increase in the landed cost of finished and semi-finished components and in that of the finished product. After the heavy excise duties of last year on automobiles and engines and the consequent large increases in prices of vehicles which they necessitated, it is most unfortunate that the Automobile Industry has once again become the subject of increased taxation. I earnestly hope that our Minister will use his powers of persuasion with the Union Finances Minister and provide some relief to the Industry.

The Ad Hoc Committee had also recommended removal of the excise duty on tyres, batteries, etc., used as original equipment on vehicles. Here again, I appeal to Shri Manubhai Shah to pursue this subject with the Ministry of Finance.

The formation of a Development Council for Automobiles, Automobile Ancillary Industries and Transport Vehicle Industries is another step forward towards the path of progress of the Industry. I take this opportunity to record the Association's appreciation of the very good work which is being done by the Development Council and its Sub-Committees.

This Association is working in close co-operation with the Representatives of the Ancillary Industries. A number of informal meetings of Representatives of this Association and the All India Automobile and Ancillary Industries Association were held during the last year when subjects of mutual interest were discussed. A Joint Sub-committee with effective terms of reference has now been constituted, primarily to promote the development of automobile and ancillary industries by securing a rapid and progressive increase in the indigenous content of motor vehicles under current development.

I take this opportunity to compliment the Ancillary Industry on its rapid progress and development in the last 3 or 4 years. The Ancilary Industry plays two important roles; (1) it assists the Main Manufacturers to increase their out-put by reducing their foreign exchange element for the imported components that could be supplied from the Ancillary Industry; and (2) it meets the demands for spare parts for the increasing population of vehicles. In the matter of supplies of components and parts as original equipments, the manufacturers naturally require the fulfilment of three conditions :—

(i) continuous flow of supplies in adequate quantities;

(ii) maintenance of high standards of quality as called for in the specifications; and

(iii) reasonable prices.

Hence the supply of ancillary components of the requisite quality in adequate quantities and at reasonable prices is assured, the vehicle manufacturers will be happy to switch over to the ancillary sources even in the case of components which are at present manufactured by them. I am glad to say that the ancillary manufacturers understand and appreciate the importance of fulfilling the three conditions mentioned earlier.

The enunciation of the Government's policy in January, 1961 with regard to automobile manufacture particularly in relation to the commercial vehicles has given the Industry an outline on the picture for the coming 5 to 10 years. Sanction to diversify production of commercial vehicles after 1st April, 1963 in regard to gross vehicle weights and wheel-bases is one more progressive step for expansion of activities.

A proposal is afoot for the production of a film depicting the growth and development of the Indian Automobile Industry. This Association is strongly in favour of the production of such a film and has decided to make a reasonable contribution towards the cost of the production. I expect that the film will be produced by the Films Division of the Union Ministry of Information and Broadcasting and exhibited in due course in India and abroad under their aegis.

Friends, the Industry had passed through difficult times in its early years. The volume of demand was very low. The picture of future development was uncertain. The position today is, however, different. The Industry has now turned the corner and confidently looks forward towards consolidation and expansion. The output is continuously on the increase without any extra allocation of foreign exchange. The indigenous content is steadily increasing. Ancillary Industries are developing at a very fast rate. The production at the end of the Second Five Year Plan period is more than double the production at the end of the First Five Year Plan period.

It is a matter of pride for all of us connected with the Industry that India has commenced export of Automobiles and automobile components to the neighbouring countries of the East. Though the volume of export has been of a limited order, the achievement is of momentous significance. The potentialities for export in the coming years will be greater and greater. Government in the Ministry of Commerce and Industry have expressed their readiness to consider concrete suggestions for removing impediments, if any, in the way of promotion of exports of Automobiles and automobile components.

* * *

Roads
Road Transport
Automobile Industry

T. S. SANTHANAM
Sundaram Industries Ltd., Madras

The automobile industry has made creditable progress during 1960. The Planning Commission in the third Plan estimates have projected the production figures of automobiles for the Third Plan period at twice that of the Second Plan period. The ancillary industry has made very rapid strides and the production rate at the end of the Second Plan is estimated at several times the figures at the end of the First Plan period. All this has been done within the limited foreign exchange made available under the Second Plan. The Third Plan targets are reasonable and the industry expects to reach the targets. With the rapid increase in the production of motor vehicles and the vehicle population, there will be greater need for better and more roads. It is already noticeable that the roads in the major cities are deteriorating and they are unable to cope up with the traffic. Congestion and bottleneck exist particularly in the arteries leading to the big cities. The development of roads in the suburban areas of the big cities where industries are springing up, is not given sufficient thought in the forward planning, with the result that there is acute congestion and loss of time. If things are allowed to continue as they are, there will be considerable slowing down of traffic both within and the outskirts of a City and thus slow down the tempo of industrial output.

The Chief Engineers in Conference have recommended that under the Third Plrn, Rs. 590 crores may be allotted for roads. In their opinion, this is the minimum. Roads and Road Transport have been given low priority in the Third Plan; as against Rs. 1,220 crores for the Railways, the allotment for Roads is merely Rs. 250 crores. This is grossly inadequate. Railways have not been able to carry all the traffic that has been generated under the Second Plan and there are serious bottlenecks in various sectors. At the end of the Third Plan, it is estimated that the Railways' share of the long distance haulage, excluding feeder traffic, is 235 milion tons as against the total estimated needs of the country of 300 million tons for all modes of transport. It is doubtful whether Railways can reach the target figure. The gap between the total needs and the allocation for Railways has to be made up mainly by Road Transport. It is here that Road Transport can play a useful part if allowed to expand without restrictions or regulatory measures which in the past have been stifling it.

The Masani committee has recommended that Road Transport should be allowed to grow and expand as it provides greater flexibility, saving in

packing and speedy transport. More and more people of our country take to Road Transport because of these advantages and also the saving in packing charges, less pilferage and other tangible and intangible benefits. Above all, Road Transport is at least four times speedier than the Railway. It should however, be admitted that Road Transport is disorganised and the 2,25,000 trucks and buses are owned by several thousands of people. The average yearly mileage done by a commercial vehicle has gone up by the end of the Second Plan to 30,000 miles bringing in a gross return of nearly Rs. 140 crores to the Central and State Governments by way of taxation in all forms. I, therefore, plead with the Central and the State Governments to give greater recognition to the Road Transport Industry and raise the status of those who are engaged in this vital industry to the level of other industrial entrepreneurs. Above all, the public preference with regard to the mode of transport should be given its proper place in the planning of various forms of transport and the bias in favour of the Railways should be given up.

I would like to invite the attention of our members to the Neogy Committee which was appointed soon after submission of the report by the Masani Committee. The Masani Committee has made recommendations for the expansion of Road Transport and has suggested the scope and manner of such expansion. Though the Government of India have accepted the recommendation of the Masani Committee in general terms, they have been slow in implementing the Report. The Neogy Committee in their interim report have stated that "one of the first tasks to which the Committee had to address itself was to determine the extent and the nature of competition offered by mechanised road transport to the railways in various regions of the country; and the recent changes in the pattern of traffic on the railways and the extent of diversion of traffic, if any, from the railways to road transport on important routes".

This sentence reveals the working of the mind of the Committee in that it expounds as axiom that there is competition by mechanised road transport. This prejudging of the issue is not correct, as the report itself says, later on, that the haulage of goods costs in broad and metre gauges 5.28 and 9.18 nP. per ton-mile and by road it costs anywhere from 12 to 47 nP. It has already been proved that the tax on ton mile by road is greater than the freight per ton mile by railway. In that report, further on, it is said: "The earning of a profit is not and has never been the be-all and end-all of the railways". What does this mean? The capital at charge of the railways from 1960-61 to 1965-66 is budgeted to increase from Rs. 1,563 crores to Rs. 2,313 crores. The financial implications of this capital investment is analysed by the Eastern Economist (in their Annual Number 1961) which says, "most conspicuous fact which emerges is that the rate of return on capital of the Indian Railways declined from roughly 2.02 per cent in 1955-56 to 1.67 per cent in 1960-61. According to the Railway Board's forecast for the Third Plan, the rate of return will decrease to 0.56 per cent in 1961-62 and 1965-66, with still lower rate of return in between." It is high time that the public at large and the policy makers determine whether the Railway investment is a commercial enterprise or a service institution—by the latter meaning that the price should be less than the cost of service. In the same report the Neogy Committee says: "It seems to our Committee that the best initial test of the public need is given by what they will pay for". It would have been better if the Committee had investigated the reasons for the public need and acceptance. But at the same time they observe "the increase in the earnings of the railways in the first two Plan periods has not been commensurate with the increase in their Capital at large."

May I submit that the above few quotations are worthy of the 1930s? It is upto the public to determine the role of railways in the national economy of our country. Is it going to be a commercial proposition or not? It is because of the absence of a clear answer to this question, the committee on Transport policy and coordination is compelled to issue another questionnaire of 18 items covering the subject of "free competition", "regulation" and "future policy". Whatever be the results of this Committee, it should be admitted that the transport needs of our country will far exceed the transport capacity of the railway in the Third

Plan. The only alternative mode of transport which can fill in the gap is road transport. Road Transport can fulfil its destiny in the planned economy only if sufficient number of vehicles is available and road mileage is increased and existing roads are bettered. It is in this context I wish to point out that the Third Plan allotment of Rs. 250 crores is very inadequate as the Chief Engineers in conference have estimated, in a conservative way, the need for Rs. 590 crores for roads in the Third Plan. As to how less than half the amount of the basic need can meet the requirements of this country is an open question. I feel there is need for re-thinking on the various means of transport in our country, as otherwise there will be breakdown of Transport in the Third Plan. There was a time when Railways were considered as the basic carrier and entitled to an inherent monopoly. The advancement of science and technology and the prohibitive cost of expansion of railways have brought about a change in the conditions and it is more realised that Road Transport has an important part to play. This is true in all the countries of the world. Even in the United States of America, they tried regulation and co-ordination and they had to give them up because they were ineffective. In our country where there is crying need for more employment and employment in towns and villages, there is greater justification and force for permitting the Road Transport Industry to expand to meet the increased needs of the nation under the Third Plan.

We must be thankful to the Central and the State Governments of Madras, Andhra and Kerala, for sparing Road Transport from further levies of taxation in their current Budgets. Perhaps they realise that the saturation point in taxation on Road Transport has been reached.

I have almost come to the end of my address. There are some difficulties about Sales tax etc. I hope that they will be ironed out by mutual discussion, as we have got a very understanding Minister in Madras Mr. R. Venkataraman.

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Mineral Use Guide Or Robertson's Spiders' Webs

By

R. H. S. ROBERTSON

Cleaver-Hume Press Limited, London

This book contains useful information in a convenient form regarding the uses of 32 of the common minerals. The uses have been systematically presented in relation to the chemical and physical properties which determine the applications. A glossary has been added explaining the various terms met with in the diagrams. An alphabetical index is also included. This is a useful reference book for any one dealing with the use of minerals. It will be good if another edition is produced with thinner folios of a smaller size so that the whole of the useful information can be had in the form of a small pocket book.

K.S.G. Doss
Director
Central Institute of Electro-Chemical Research
KARAIKUDI
South India

Shipping in India

P. SUBBAROYAN
Union Minister for Transport and Communications

For a country like India with a long coastline of over 3,000 miles and occupying a strategic position in the Indian ocean, the importance of shipping and ports needs no emphasis. Although historically India has been a maritime country and her maritime traditions are well known, the growth of Indian shipping is of comparatively recent origin. Only in the post-Independence era that the Government of India has adopted positive measures of assistance to the national shipping industry.

The reservation of coastal trade for national shipping, the setting up of the Shipping Corporations in the public sector—these were amalgamated into the Shipping Corporation of India on October 2—the grant of loans to shipping companies on concessional terms for the purchase of ships, the creation of a statutory non-lapsable Shipping Development Fund, the grant of a rebate at a specially high rate of 40 per cent to the shipping industry and the setting up of a Shipping Co-ordination Committee are some of the important measures taken by Government to develop the mercantile marine.

The Indian tonnage which was hardly one lakh GRT at the end of the last war has now increased to about 9 lakhs GRT. While our shipping had only one-third share in the coastal trade of the country during the pre-war period, it is now carrying the entire coastal trade.

While the operation of Indian shipping was previously confined to the coasts of India, Burma and Ceylon, Indian shipping has now entered several important overseas trades, such as India | the UK Continent, India | North America, India | Far East Japan, India | Australia etc.

Tonnage Inadequate

Notwithstanding the progress already made, the existing Indian tonnage is still very inadequate for our requirements. We have an extensive overseas trade amounting to Rs. 15,000 | Rs. 16,000 crores per annum, but only about 10 per cent of it is carried in national bottoms. The coastal tonnage is also inadequate as has recently been highlighted in the case of movement of coal by sea.

The Indian merchant fleet is also deficient in bulk carriers, tankers and tramps. It is evident that much lee-way has yet to be made.

A monetary provision of Rs. 55 crores has been made for the acquisition of tonnage during the Third Plan. It is estimated that with this amount and the resources available with the Shipping Development Fund and private sector shipping companies it will be possible to add 57 ships with a total tonnage of 3,75,0000 GRT to the Indian merchant fleet.

Of this tonnage, 1,94,0000 GRT are required for replacement of average ships; the net addition of tonnage is expected to be of the order of 1,81,000 GRT. This will increase the Indian tonnage to about 1.1 million GRT by the end of the Third Five-Year Plan.

The recent decision of the Government to carry an additional one million tons of coal by Indian ships is likely to give a fillip to coastal shipping and an addition to the coastal tonnage may be expected.

Ship-building

Along with the development of shipping, the ship-building industry has also been making steady progress. The annual output of the Hindustan Shipyard Limited which was only Rs. 1.5 crores in 1952–53 has risen to 4.01 crores by 1959–60. A provision of Rs. 244 lakhs has been made for the further development of the Yard during the Third Plan and with the completion of this development programme the production capacity of the Yard is expected to rise to about 40,000 GRT per annum.

The Government has also decided to set up a second shipyard at Cochin at an estimated cost of Rs. 20.5 crores. The production capacity of this shipyard will be 60,000 GRT per annum, capable of being increased later to 80,000 GRT per annum.

As regards ports, the record of progress since Independence has been impressive. At the time of Independence, we had five major Ports, viz., Calcutta, Bombay, Madras, Cochin and Vishakhapatnam. The development and modernisation of these ports had been held up owing to war, and their plant and equipment had been worn out due to excessive war-time use. There was also no plan for the improvement of the minor ports.

One of the first steps taken after Independence was the development of a new major Port at Kandla. We are expanding it further at present. An excellent terminal for deep-drafted oil tankers was built at Bombay. At Cochin, several striking improvements were made. An additional alongside berth for general cargo was added. The wharf front was improved. New oil and coal berths were also built. Four new berths in the Ernakulam Channel are fast nearing completion at Cochin to provide the much-needed relief to this hard worked port.

At Madras, a modern passenger station has been built. The North Quay has been remodelled. New mechanised ore and coal berths have been provided. And a new wet dock capable of accommodating six vessels is under construction.

At Vishakhapatnam, new berths for general cargo and oil have been added. A scheme for the addition of four new berths, two of which will be earmarked for iron ore traffic, is under execution. A traffic of six million tons of ore is expected at this Port when the proposed belt conveyor plant is set up. At Calcutta, new berths have been added. The marshalling yard is being improved and the old docks are being renovated and strengthened.

Plan Allotment

During the First Plan period Rs. 26.27 crores were spent on our major ports. The corresponding figure in the Second Plan is Rs. 45.4 crores. The programme for major ports included in the Third Plan is expected to cost about Rs. 90 crores.

Provision has also been for the development of Haldia as an auxiliary Port in the Calcutta region in the Third Plan. It has also been decided to develop Tuticorin and Mangalore as major ports. A satisfactory solution for the long pending problem of modernisation of Bombay Docks has also been evolved. When the new scheme is implemented, Bombay will have four additional berths inside Alexandra Dock and two to three berths on the Harbour wall side for the ocean-going steamers.

Although the minor ports are mostly under the executive control of the State Governments, the Central Government has bestowed special attention to their development also and has been granting loans for their development.

Schemes costing Rs. 10.6 crores have been included in the Third Plan for minor Ports. A very important step towards maintaining the efficiency of our minor ports is the decision to set up a pool of dredgers and survey vessels specially to meet the requirements of such porrs. The craft have already been ordered for this purpose.

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India's Aircraft Industry

HF–24

1961 marks a turning point in the history of the Aircraft Industry in India. The first Supersonic aircraft designed and built in India has been successfully test flown at Hindustan Aircraft Limited, Bangalore. India is the first Asian country to achieve this distinction. The HF-24, in addition to its basic role as a fighter, has been specifically designed to be used in several other roles and to meet the various requirements of the Indian Air Force. When the HF-24 goes into Squadron Service, the IAF will have an aircraft with an all round performance equal to the best anywhere in the world.

GNAT

Concurrently with plans for the commencement of the series production of the HF-24, the manufacture of the Gnat Transonic light weight Jet Fighter aircraft also for the Indian Air Force is fully under way at the Hindustan Aircraft Ltd. This aircraft is being produced under licence from Messrs. Follands of the U.K.

The Orpheus engines powering the HF–24 and Gnat are also under manufacture at the HAL Jet Engine Factory. Further the Rolls Royce Dart Engines are also to be manufactured at HAL factory. They will power the Avro 748 being built at Kanpur.

In the field of light aircraft manufacture, Hindustan Aircraft Ltd., have put on the market an ultra-light two-seater aircraft, the Pushpak, primarily to fulfil the immediate needs of Flying Clubs. The Pushpak is probably one of the lowest priced aircraft in the world in its class.

Also for the first time in India, a prototype of a suitable engine of the piston type to power this aircraft has been made and this is now undergoing development trials. These developments rest on the solid foundation of just over 20 years of experience and achievements that have marked the growth of Hindustan Aircraft Limited.

Hindustan Aircraft Ltd., was founded on December 24, 1940 by the well-known Industrialist, Mr. Walchand Hirachand, for the manufacture of some types of American aircraft under licence. This endeavour was short-lived because about the time H.A.L. completed the manufacture and assembly

of the first Curtiss Hawk fighters, Vultee Bombers and Harlow Trainers, the second World War intervened and the factory was taken over by the Government of India for the establishment of a base to undertake the overhaul of fighters, light and heavy bombers, Flying boats, Aero-engines, instruments, accessories and allied equipment used in the Far-Eastern theatres of war.

On the attainment of Independence Hindustan Aircraft did a great job in rehabilitating old and broken up aircraft and making them airworthy. The value of this work to the country and the Indian Air Force at this critical period was considerable.

The Government of India decided in 1946 to utilise the existing capacity of equipment and skilled personnel of the Hindustan Aircraft to undertake the manufacture of aircraft and engines and other components to cater to the needs of the Air Force and the requirements of Civil Aviation.

A beginning on the side of production was made by the assembly and manufacture of Prentice trainers for the Indian Air Force, under licence. Later a hundred Tiger Moths were erected and turned over to the Air Force. With the experience gained a more ambitious programme for the manufacture of the De Havilland Vampire Jet Fighters and Trainers was undertaken. In recent years hundreds of Vampire Fighters have been manufactured and turned ever to the Air Force. By progressively reducing the cost of manufacture of these aircraft H.A.L. has been instrumental in effecting a considerable saving in our foreign exchange expenditure.

Simultaneously, HAL successfully designed and manufactured in quantity and all-metal two-seater trainer for the replacement of the Tiger Moth. This aircraft designated HT–2 has been the basic trainer for the I.A.F., the Indian Navy and the Civil Aviation Training Centres. This was the first aircraft to be indigenously designed and manufactured in India.

Thus to the new projects concurrently undertaken H.A.L. brings a fund of technical know-how and experience accumulated since it embarked on the manufacturing programme in 1947. H.A.L. has also developed a well-equipped Foundry & Forge with a metallurgical and radiological laboratory to it.

Ever since it was established H.A.L. has been serving as the pivotal point in the East for the repair and overhaul of both airframes and engines not only of Indian Civil and Military aircraft but also of aircraft from overseas customers. As this phase of its activities tended to grow, it was found necessary to establish a branch factory at Barrackpore near Calcutta in 1952. This was set up as the first step in the eventual bifurcation of the two main aircraft activities-Manufacture and Overhaul.

Lately the factory has also undertaken the overhaul of Jet airframes and jet engines.

Railcoach Manufacture

As in aircraft construction, so also in the realm of rail transport H.A.L. has blazed a new trail. Taking up railcoach manufacture as a major subsidiary project in 1947 Hindustan Aircraft made a revolutionary contribution to the field of rail coach construction in India with its all-metal broad-gauge rail coaches. Approximately, 1,600 all-metal coaches of the conventional design have so far been delivered by H.A.L. to the Indian Railways ; this figure includes 60 military coaches of an improved design.

Recently HAL has launched on the construction of a more advanced type of Coach, viz., the all-steel Integral Coach. Production has already reached the figure of 300 per year.

In conclusion, in may be stated that our aircraft industry has made commendable progress although we have still to develop supporting industries for the manufacture of basic raw materials, electrical equipment, instruments, etc. But, this is only a matter of time as during the 14 years of our independence, our industrial activity has increased enormously bringing the goal of self-sufficiency nearer. ***

United Nations Seminar on Industrial Estates in the ECAFE Region

U NYUN

Executive Secretary Of
The United Nations Economic Commission For
Asia And The Far East

I have great pleasure in welcoming you all to this United Nations Seminar on Industrial Estates. We are gathered here to-day in this great city of Madras to study a subject of strategic importance to economic development of the countries of the ECAFE region. This Seminar has been organized jointly by the United Nations Bureau of Technical Assistance Operations and the Division of Industrial Development of the United Nations Department of Economic and Social Affairs, and the ECAFE Secretariat. I wish to express on behalf of all of us our grateful thanks to the Government of India and to the Government of Madras for the excellent arrangements they have made for convening the Seminar. We are also deeply grateful to the Honourable Minister Shri Bhaktavatsalam and the Honourable Minister Shri Manubhai Shah for honouring us by their presence and for their warm and inspiring addresses.

In the newly developing countries of this region, the greatest challenge today is how to accelerate economic growth and to improve the levels of living rapidly. The achievement of these objectives calls for creative thinking, for new stimuli, and for positive institutional approaches to the many development problems involved. In the industrial field, several important institutional techniques have been evolved by the ECAFE countries during recent years. These include productivity movement, industrial extension services, investment promotion institution, development banks or corporations, supervised credit schemes and common facility arrangements, etc. One of the most recent additions to these measures is the wide-spread establishment of industrial estates.

The role of industrial estates as an effective means of promoting industrial devlopment has been stressed, on several occasions, by the Economic and Social Council, as well as by the Economic Commission for Asia and the Far East. Although the idea of establishing industrial estates was formulated nearly seventy-five years ago, its application to the promotion of rapid industrialization is still comparatively new.

Historically, the first estates were established in the 1890's both in the United Kingdom and in the United States. In the 1930's the Government of the former country actively encouraged the development of industrial estates, both to combat unemployment in the depressed regions and to decrease industrial overcrowding in big cities. This development was given further impetus after the Second World War. At that time, the United Kingdom adopted a nation-wide policy of industrial

location designed to divert new industries from congested areas to certain under-developed regions and new population centres. Since then, the use of this institutional technique, under different names, has gathered momentum all over the world. There are now organized industrial tracts, districts or parks in the United States and the USSR, trading estates in the United Kingdom, industrial zones in Italy, industrial sub-divisions in Puerto Rico, flat factories in the Netherlands, industrial cities in Brazil and Mexico and small industrial estates in the north western European countries. Small industrial estates are also now in two African countries, Ghana and Nigeria, and in several Middle Eastern countries including Israel.

In the ECAFE region, India has spearheaded the development of industrial estates. Some 120 estates are now being constructed all over the country. Here in Madras, we shall have the opportunity to observe one of the most efficient and important estate-the Guindy Industrial Estate-in operation. In other countries there are also many estates now being planned or already under construction. These include the Ja-Ela estate in Ceylon, the Liu-Tu and Tsing-Shui Industrial Districts in China: Taiwan, the Petaling Jaya Estate in the Federation of Malaya, the Kwun Tong estate in Hong Kong, the Karaj Estate in Iran, the Hokkaido and Tohoku industrial districts in Japan, the Patan Estate in Nepal, the Karachi and Hyderabad Estates in Pakistan and the Red Hill and Jurong Estates in Singapore. The very sound of these widely varied geographic names indicates the breadth of this new surge of development and signifies that a new wind of enterprise and adventure is blowing vigorously across the great continent of Asia.

Moreover, behind these geographic names, there are many inspiring human stories. In one of the discussion papers for the Seminar, you will find several case histories which vividly portray the creation of a large number of new enterprises on various industrial estates in India. You will find the story of three young technicians who pooled their resources and succeeded in starting a gear-manufacturing unit on the Guindy estate. You will read of an insurance agent who set up a razor blade factory on the Okhla estate, and of a former worker from the Hindustan Aircraft Factory who established a metal workshop on the Bangalore estate. Perhaps the most encouraging story of all is that of a farmer who put up a diesel engine workshop on the industrial estate at Ludhiana; for this illustrates the ability of a man trained in the most ancient of occupations to adapt himself marvellously to the conditions of a new age.

These excellent enterprises would scarcely have come into being without the assistance of industrial estates and the promotional efforts of the Central and State Governments. With industrial lands and buildings provided on the estates, manufacturers save substantially by requiring less initial capital investment. Furthermore, the inter-trade services and common facilities made available on the estates help not only in reducing investment but also in producing better qualities goods at lower costs.

From the point of view of the national economy as a whole, it is equally apparent that the potential contributions of industrial estates are very considerable. They provide a method by which Governments can guide geographic distribution of industries and select the types of industries to be promoted. Grouping industries in carefully selected areas saves investment in basic facilities and makes it much easier to provide such industries with the necessary financial and technical assistance. Also, the estate provides a convenient training ground for skilled workers and entrepreneurs, who are in short supply in newly developing countries. Above all, the estates help to attract new investments. Simultaneously, there are many advantages to the local community and to the region concerned. Industrial estates usually become the nucleus for industrial and commercial growth. They create new employments and tax revenues. They help to prevent or reduce congestion in the urban areas.

In enumerating these advantages of the industrial estates, we should perhaps also bear in mind some of the limitations and pit-falls which must be guarded against. First, there is the fundamental question of over-all industrial location policy. Most countries of the region attach considerable importance in their development plans to the need for promoting balanced regional growth in order to avoid disparity in development between regions. However, in practice, a decision on the selection of industries to be located in the backward areas is always a complicated one. It necessarily involves assessment of the comparative costs of the industrial projects and of the magnitude of their potential contribution to the regional development. During recent years, there have been cases in several countries where industrial projects were too hastily located because of an urgent desire to promote the development of backward areas. Some of these have been running at too high a cost. The reasons for this include lack of basic facilities and difficulties encountered in creating a steady labour force and a growing market. Yet the development of backward areas can be achieved, stage by stage, with the building up of the basic facilities, the improvement of agricultural and community development projects, the

promotion of small industries, and a careful assessment of natural resources in the areas. Above all, advance measures must be taken to ensure local participation in the development programmes.

• Secondly, there is the controversial question as to what constitutes the "economic size" of industrial estates. Concerning this, there are two contrasting concepts. On the one hand, there is the principle of favouring a large number of small estates, built primarily for small-scale industries. On the other hand, there is the principle of bringing together, in a few vast areas, large industrial complexes as "development poles" or "centres of gravity" around which a network of modern medium and small-scale industries will be created. It is argued in one of the discussion papers that the cost of providing basic facilities per unit of product for a "small estate" is much higher than that for a "Large estate". Perhaps, there is no general rule for applying either of these two concepts to all countries. Much will depend upon the economic and social conditions prevailing in each of them. This is a difficult problem which requires much more careful examination than it has hitherto received.

Thirdly, there is the important question of rural industrial estates. The economic and social factors to be considered in setting up industrial estates in rural areas are obviously different from those involved in establishing estates near an urban centre. Rural industrial estates are still at an experimental stage. In view of the immense importance of rural economy to the countries of the region, this subject should most certainly be further explored.

Apart from these policy issues, there are many technical problems relating to the financing and management of the estates, estate layout and factory building designs, the provision of industrial advisory and common facility services, and the organisation of training programmes for entrepreneurs and workers. I have no doubt that your deliberation will help not only in clarifying the basic policy issues, but also in formulating specific measures which should be taken, either at the national or at international level, to speed up development in this field.

I am glad to note that several of the country papers presented by the Governments for the Seminar especially stressed the need for close international co-operation in the development of Industrial districts and estates. Already, several multi-lateral and bilateral programmes are providing assistance to the development of industrial estates in newly industrialising countries. For instance, the Government of India is assisting the establishment of industrial estates in Nepal. Japan is providing assistance to the development of the Jurong Industrial Port in Singapore; and the United Nations has been giving assistance to Indonesia and Singapore.

Apart from technical assistance, there is also the important question of financing. Generally, the cost of land acquisition and building construction can be met by countries from their domestic resources. However, many countries will need foreign exchange for the purchase of power plants, equipment and machinery for the various production and demonstration centres associated with their industrial estates programmes. In particular, external financial assistance is often needed in the development of large industrial estates and industrial ports. This is another question which deserves the attention of this seminar.

Finally, I should like to mention here that, to be really effective, an industrial estates programme must be regarded as an integrated part of the over-all national development plan. For this reason, when last year the United Nations Bureau of Technical Assistance Operations and ECAFE sent a comprehensive industrial feasibility study and investment promotion mission to Singapore, an industrial estates advisor was specially included in the mission. We have now under consideration the organization of a similar mission for Burma at the request of the Government of Burma. The means of integrating industrial estates programmes with over-all industrial development plans will form an important part of the work of the mission.

In the final analysis, the rate of industrial development in a country is determined largely by two related basis factors, namely, market and investment. The discussion papers on the development of "the Port and Industrial Zone of Marghera" in Italy clearly illustrates that the rapid expansion of this industrial port has to a considerable extent been due to the extension of the market in the countries of central Europe. The form of regional economic co-operation among the countries in the ECAFF region has not, of course, reached such a stage as that in Europe. Nevertheless, it has become increasingly important for the ECAFE countries to imbue their national development policy with a regional outlook. During the past decade, the underlying principle of the industrial policy of countries in the region was that, by utilising the technical "know-how" provided by the industrially advanced countries and by simultaneously intensifying national efforts, it should be possible to achieve a reasonably accelerated rate of industrial growth. It has now become increasingly clear, however, that for many countries, particularly the smaller ones where the domestic market is limited, a third element has to be added if the desired rate of growth is to be achieved. This is the necessity of working for close economic co-operation with the neighbouring countries. The need for concerted efforts by the ECAFE countries in industrial development, in the form of market-sharing or other arrangements was stressed by the Economic Commission for Asia and the Far East in a unanimous resolution adopted at its sixteenth session. Thus, although we have been used to thinking about industrial location policy and the industrial estates programme in items of national requirements, the time has now come for us to think of them increasingly in terms of regional prospects. This is no longer a question of academic interest; it is a vital question which is commanding the fast growing attention of the countrles in the ECAFE region.

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Government of India Trade Representatives Abroad Report

Australia

The demand for jute bags and sacks, jute piece-goods excluding carpeting and hessians, corn and flour sacks, secondhand bags and sacks, wool packs, carpets, gums and resins, tea, cotton waste, spices, etc., is increasing in Australia. The total value of the different varieties of jute goods exported to Australia was £ 12 million in 1960-61, as compared to £7 million in 1959-60. The main competitors are Japan, China and Hong Kong.

East Africa

The Government of East Africa have imposed restrictions effective from 1st October, 1961 on the import of goods from India packed in rice, maize and sorghum straw and other residues of these plants, banana leaves, soil and leaf mould. The restrictions do not apply to straw of wheat, barley and oats.

Finland

The imports of the following commodities have been liberalized in Finland : soap flakes and powder, cut-out patterns, surgical silk, certain impregnated textile fabrics, made up accessories for articles of apparel, chairs with aluminium and plastic materials, articles made of foam rubber, pocket-torches and artificial plastic material. Interested parties may contact the Embassy of India, Helsinki for suitable trade connections.

Japan

The Japanese Government have decided to liberalize imports of about 90% of commodities by September next year. Items which have been liberalized on October 1st, 1961 are : pocket and wrist watches ; parts and components for paper pulp textile, wood-working, agricultural and mining and civil engineering machinery ; carbonic acid, phenol resin, tripoli, sodium phosphate, folic acid, sulfamin drugs, aminoyprine, most rayon staple fibres and silk products, vegetable and animal oils and silk products, vegetable and animal oils and fats, nickel mandarine and other fruits, peanut, butter, salmon, trout, tuna, bonite, etc.

Other items the import of which is likely to be liberalized by December 1st, 1961 are : pulps, parts of sewing machine for industrial use, movie cameras, small-sized ordinary lathes, ram-type turrets, large-sized milling machines, parts of paper pulp machinery, electric-motors, transformers, cellulose paints, ordinary glass plate, vegetable juice (except tomato juice), oat meal, fruit flavours, curry, etc,

Netherlands

Under the Netherlands import system, goods not figuring in the list of exceptions can be imported without quantitative restrictions and without a licence, Formally the import of all goods is prohibited unless the import licence has been obtained from the Central Import and Export Office but in practice the Netherlands Government take a liberal view.

The import of absinth, phosphorous matches and waste of aniline dyes containing arsenic is prohibited. Musk rats, bones, ground bones, fertilizers containing

animal meal, bone meal and blood meal, skimmed-milk with a fat content of less than 1%, pesticides, explosives, hand fire-extinguishers, manure, electrical products, threshing machines, lifts, voltage regulators for electric fencing, opium and other drugs, tuberculin, serums and vaccines, etc., are imported on certain conditions only. Precious metals and other goods cannot be imported without a licence.

The import duties in the Netherlands vary from nil to 30% *ad valorem*. In general raw materials are either exempted or duty varies from 3 to 6%, on semi-manufactures from 10 to 12% and finished products from 15 to 24%. In addition to import duty a turnover tax is levied equivalent to the purchase tax paid on similar products in the home market which amount to 5 to 10% *ad valorem*. Excise duty is leviable on beer, spirits, light mineral oil, sugar, processed tobacco, wine and products containing sugar or alcohol.

Saudi Arabia

Tea is one of the most popular beverages in Saudi Arabia. Consumers give preference to long curly leaves of tea. Tea imported in Saudi Arabia may be broadly classified into two categories : high quality tea, and common grade tea. The most popular among common grade tea is Abu Jabal imported from Ceylon. Some Indian brands of tea comparing favourably with Ceylonese brand both in price as well as in flavour and taste can be successfully introduced in this country. Some local importers have also expressed a desire to introduce Indian brands of high quality tea provided the packing is in attractive tins and the prices are competitive.

There is also a good scope for the export of electrical goods like cables and wires to Saudi Arabia. At present the main suppliers are England, Germany, U.S.A., Belgium, Holland, Italy, Japan and Czechoslovakia. Good prospects also exist for the export of sewing machines, bicycles ; torch, motor cars and other batteries, hurricane laterns and ceiling and oscillating fans. Manufacturers and importers of these items may contact the Commercial Section, Embassy of India, Jeddah, Saudi Arabia.

Singapore

A large volume of artware is imported in Singapore and Malaya by postal parcels. The import of Indian carved articles, works of art and decorative articles of brass and bronze in 1960 was of the value of $ 1,15,000, $ 5,000 and $ 59,000, respectively. Wooden carved articles from India have subs antial market in Singapore and Malaya. The main competitor is Ceylon as her products resemble in style and motif with that of Indian products. There is need for co-ordinated efforts and sufficient export promotion drive from the Indian exporters. There is considerable scope to introduce works of arts including paintings, etchings, etc., provided they are rich in variety.

U.S.A.

Indian exports of ivory manufacturers to the U.S.A. are far behind to those of Japan and Hong Kong. However, imports from India in 1960 were of the order of $ 23,000 as compared to $ 13,000 in 1959. This indicates an increase of 90% and has been achieved in spite of a ⅓ decrease in the total imports of ivory manufactures. Indian exports of ivory manafacture to the U.S.A. could be stepped up if the prices are comparatively less and goods are better in design. Theme and motif of the ivory goods should remain Indian with a greater variety and originality in conception and design in accordance with the Western tastes.

West Germany

The new law on foreign trade and payments and the regulations framed thereunder came in effect in West Germany on 1st September, 1961. It provides that when goods are imported free of permit the importer merely has to submit an import declaration on the prescribed form. The forwarding agent in Germany may, however, submit the import declaration in his own name in respect of the goods under the import contract. For goods imported under import permit only, the importer is entitled to apply for the permit. Import declaration or permit must indicate the country of supply and the country of origin. The certificate of origin has to be furnished for certain goods indicated in the import list. The 'Every man' import scheme has been made more liberal. It permits the free import of goods not exceeding a total value of DM 200 per consignment, as against only DM 100 hitherto. Certain items such as food products, prismatic binoculars as also those subject to import quota, are excluded from this scheme. The earlier restriction on import of goods by post has been lifted.

Zanzibar

The Government of Zanzibar have announced increased import duties on certain commodities. Duty ranging from 20 per cent to 22½ per cent has been imposed on betel and other nuts, vinegar, foodstuffs, animal oils, paints, enamels, varnishes, manufactures of rubber, trunks, chests, suitcases and similar articles, lether, dressed and manufactures thereof, cotton piece goods, silk, blankets, travelling rugs and coverlets, prepared sauces, pickles, jewellery including imitation jewellery, precious stones, household utensils, hollow-ware excluding buckets, dustbins, etc. Other items on which duty has been increased are : edible fats, pulpwood, toys, iron and steel plates and sheets, asbestos and cement manufactures, bricks, tiles, soap, cotton piecegoods, perfumery, cigarette paper, wheat flour, garlic, sugar, coffee, tea, motor parts, etc.

Technoexport

The Bulgarian State Commercial Enterprise, "Technoexport", Sofia, Bulgaria, is interested in assisting the construction of various projects such as hydro-electric power stations, silos, etc. Technoexport will do planning of the project and supply machineries, impart technical know-how and train the Indian staff technically. Interested parties may contact the Trade Representation of the People's Republic of Bulgaria, 150, Golf Link Area, New Delhi for further details.

Progress Parade

We invite short writeups on manufacturing programmes from leading industrial houses in India. Photographs are also welcome.

Kumari VASANTHA

Saru Engineering Corporation Ltd.

The industrial house of Seth Jugmandardass Shitalprasad Jain of Meerut has been granted an Industrial Licence for manufacturing Spun Cast Iron Pipes at Meerut. The sanctioned installed capacity of the Plant has been set at 24,000 tons per annum by the Ministry of Commerce & Industry.

A new Public Limited Company has already been floated under the name of "SARU ENGINEERING CORPORATION LTD." which will take-up the execution of the new Project under the said Industrial Licence. The authorised capital of the new Company is Rs. 60 lakhs and it may be expected that the Company will be in the market in about 6 to 8 months time for almost the entire amount.

The promoters of the Company, Seth Jugmandardass Shitalprasad Jain have made, in the past, valuable contribution in the field of Non-Ferrous Metals & Alloys. They had previously established another industrial enterprise by the name of "SARU SMELTING & REFINING CORPORATION PRIVATE LTD." which concern is now well known throughout the country for its pioneering Non-Ferrous Metal Products such as Resin Cored Solder Wire, Silver Brazing and other Welding Alloys and a large number of other Non-Ferrous Alloys & Metals.

The new unit for Spun Cast Iron Pipes, being located in Western U.P. (just near Delhi), will be in a position to cater to the demands for such Pipes of a wide area comprising of Delhi, Punjab, Rajasthan, U.P. and Madhya Pradesh. From here supplies can even be made upto Gujarat and Maharashtra as well. The proximity to the West Pakistan Border also is an advantageous factor for making exports to that country. With the new Steel Plants of the country coming into full production and large quantities of

iron-scrap available in the local region, the project is expected to have no difficulties of raw materials supply.

•A member of the promoting firm, Shri S. S. Jain, who is also a Director of the new Company has recently visited a number of countries, including Germany, Switzerland, U.K. and U.S.A. to investigate possibilities of financial and technical collaboration for the Project and has been able to secure interesting proposals from firms of international repute in all these countries.

The U.P. Government is encouraging the establishment of this new venture at Meerut in order to give a better equilibrium to heavy industries in the State. It is expected that the State Govt. will sanction the necessary Electric Power on the completion of Harduaganj Extension Project in this otherwise Power hungry area. It is also being hoped that the Railways will make available sufficient transport facilities as also on assisted siding to the new factory.

The existing Company of this group, that is, Saru Smelting & Refining Corporation Private Ltd. has also been granted an Industrial Licence to establish a new Division for producing Steel Castings, with an installed capacity of 3,000 tons per annum. Negotiations on this Project are also in a sufficiently advanced stage.

These two new Projects are expected to take this fast developing Western U.P. District of Meerut, further into the arena of heavy industries as also to bring the more and divergent aspects of Iron & Steel Industry to this area with prospects for various small scale ancillary industries in the locality.

New Standard Engineering Co.

Shri Jethabhai V. Patel, M.I.Mech.E., M.I.E , M.I.P.E. is the Managing Director of the New Standard Engineering Co. Ltd., which under his management, during the year, made rapid strides in progress. The three factories of the Company at Carroll Road, Byculla and Santa Cruz, being fully pre-occupied, necessitated the establishment of the fourth new factory—the first unit, Structural Shop at Goregaon which has gone into production on 21st January 1961. This factory covers an area of about 150,000 sq. ft. and is suitable for mannfacturing not only structural steelwork, but also industrial plant and equipment such as Chemical Vessels, Metallurgical Equipment, Travelling Cranes, industrial vessels, receivers, condensers, pressure vessels, oil extraction plants, etc. The capacity of this factory will be about 10,000 tons per annum. The Company has also entered into various collaboration agreements outstanding amongst them being with Messrs. B. & S. Massey Ltd., Manchester, for the manufacture of their complete range of Pneumatic Power Hammers and Drop Forges. The production of 2, 3 and 5 cwt. hammers is already in hand and during this year about 30 hammers will be produced for sale. The Company has also entered into a Collaboration Agreement for the manufacture of Low Frequency Induction Furnaces for the melting of cast iron, steel and non-ferrous metals with the famous Italian firm, Messrs. Forni A. Elettrici Tagliaferri s. p. a., Milan. The production will commence before the end of this year. It has also entered into collaboration agreements with German firms of Messrs. Trutzschler & Co., and Ernst Jacobi for the manufacture of textile Blow Room Machinery and Augusta Suction System and Overhead Cleaners. The manufacture of these products is in an advanced stage in present schedule and in the near future it will be transferred to Goregaon.

Mr. Patel takes active interest in the Engineering and Industrial Circles of Bombay and he is connected with many Trade Organizations. He is the Chairman of the Mechanical Section of the Institution of Engineers and past Chairman of the Institute of Production Engineers. He is also a Chairman of the Engineering Association of India, Vice-Chairman of the All India Manufacturers Organizations and Chairman of the Indian Institution of Foundrymen, Bombay Region.

Khandelwal Udyog

KHANDELWAL UDYOG LIMITED, a company of the 'KHANDELWAL GROUP' of Bombay, have concluded a technical collaboration with ING. F. FERRE & CO., S.p.A., Milan, Italy, for the manufacture of Industrial Furnaces. The collaborators are one of the leading Furnaces Manufacturers in Italy

and their Equipment is already being manufactured in other European Countries under licence.

When in full production Khandelwal Udyog's Furnace Department will be manufacturing Furnaces worth Rs. 25 lakhs per annum. Their manufacturing programme includes both Electric and Combustion Furnaces and will specially serve the growing requirements of the Engineering and Matallurgical Industries. Their ranges will cover various types of Furnaces for bright annealing of wires and strips, and continuous automatic lines for heat treatment of ferrous and non-ferrous components. Furnaces for the Glass and Ceramic Industries will also be manufactured.

With the exception of the Automatic Controls and Instrumentation it is expected that most of the major components of these Furnaces will be manufactured indigenously, right from the commencement of production.

Shipping Corporation of India

Arising from the amalgamation of the State-owned Eastern and Western Shipping Corporations, it will have an authorised capital of Rs. 35 crores and a paid-up capital of Rs. 23 crores. Shri C. P. Srivastava will be the Managing Director. The Board of Directors of the two Corporations resolved unanimously in February last to recommend to the Central Government that the amalgamation of the two Corporations should be brought about as early as possible, as that would lead to better co-ordination in the working of the Corporation and to economy in the long run. The overall earnings of the two State-owned Eastern and Western Shipping Corporations have increased from Rs. 4,07,79,329 in 1959-60 to Rs. 6,07,15,218 during 1960-61, showing an increase of about 50 per cent. Both the Corporations together own 19 ships of a total tonnage of 138,593 G.R.T. The cargo lifted by the two Corporations in 1960-61 was 5,17,619 revenue tons and the freight and passenger earnings, including charter hire, during the same period were Rs, 5, 63,45,721.

During 1960, the two Corporations ran these cargo services: India-Australia; India–Japan; India-Black Sea; India-Poland; India-Persian Gulf and passenger-cum-cargo services to Bombay-East Africa; Madras-Singapore; and India-Mainland-Andamans. Two more routes havs been added this year. They are: West Coast India-West Pakistan | Far East-Japan and India-Pakistan | U.K.-Continent Service.

Apart from the gross registered tonnage of 1,38,593, owned by the Corporation as on October 2, 1961, it will have five fast cargo vessels under advanced stages of construction at the Hindustan Shipyard, Vishakhapatnam. These five vessels are expected to be delivered during 1962-63. The entire fleet of the Corporation is engaged in routes where foreign exchange is being continuously earned or saved. Out of the 18 vessels which have been so far in operation, as many as 16 have been employed in the overseas trade. The remaining two vessels, which are coastal tankers on charter to the oil companies, are also earning foreign exchange. The 19th vessel, which is just being delivered to the Corporation, "Vishva Nidhi"—is being placed for its maiden in the India-U.K.-Continent route.

Philips India's Annual Report

Hon'ble Shri K. C. Reddy, Minister for Commerce & Industry, Government of India, handed over to Mr. P. C. Vink, Chairman and Mangaging Director of Philips India Limited, a shield representing the first prize for the best presented accounts for the year 1959–60 at the recent annual meeting of the Council of the Institute of Chatered Accountants of India, held in Delhi.

The scheme introducing the award of the shield and certificate has been, according to Shri C. P. Mukherjee, President of the Institute, an unqualified success contributing effectively towards the setting up of a high standard in the presentation of accounts.

Indian Foundry Moulding Sands

For the first time, technical data on the properties of moulding sands, bonding clays aad other bonding materials occurring in India have been made available to the foundry industry in India as a result of an extensive survery carried out by the National Metal-

lurgical Laboratory of India. The first results of the survey are embodied in a 180–page monograph just published by the Council of Scientific & Industrial Research, Rafi Marg, New Delhi.

The monograph gives the chemical, physical and moulding characteristics of more than 40 samples of indigenous foundry sands from all over the country.

The moulding sands which have been examined include natural sands, silica sands and one special zircon sand. Bentonite clays have been examined for their suitability as bonding materials. Recommendations for the utilization of these sands in mouldings for different metals and alloys have been also made.

The survey fills an important lacuna in the development of the foundry industry which did not have adequate technical data available to it. This information is of prime importance for the planned and rational utilization of these sands.

With growing demand by the engineering and basic industries for castings of exacting specifications with close telerance limits, quality control has become essential. Of the various factors contributing to increased productivity in modern foundry practice, the use of suitable foundry sands and other moulding materials is of great importance.

At present, about 80,000 tons of steel castings are made in about 1,500 established foundries. More and more heavy quality casting of above 100 tons are being moulded in the country. The most significant contemporary development in foundry technology is the realization of the importance of proper selection and use of foundry sands and moulding materials.

Towards this end, the results of the survey will provide the much needed technical data. The scope of information published covers petrological and chemical composition of sands as well as their fineness, moulding and casting characteristics.

The monograph, priced at Rs. 15.00 will be useful to those concerned with the development of foundry industry and technology. The monograph is available from the Under Secretary, Publications Directorate, Council of scientific & Industrial Research, New Delhi.

Symposium on "Ferro Alloy Industry In India"

Metallurgical partnership of special and alloy steels with the ferro-alloys started more than a century ago when Robert Mushet happened to add manganese to the then newly invented Bessemer-Kelley process of pneumatic steel-making, providing thereby the solution to a major *cri-de-coeur* in the metallurgy of steel. Ferro-alloys, such as ferro-titanium, ferro-chronium, ferro-molybdenum, ferro-tungsten, ferro-vanadium etc. are chiefly employed for introducing respective alloying constituents, whilst ferro-manganese and ferro-silicon act as scavengers and deoxidizers and as alloy additions—in either capacity, ferro-alloys are *sine qua non* in modern steel production technology. The burgeoning ranges of ferro-alloys currently in use also include super purity electrolytic manganese and chromium which are further refined if required by solid-state vacuum treatment to eliminate gases.

Since the turn of the last century, technological developments based on research and development techniques in the production of ferro-alloys have been phenomenal both in range, types and characteristic qualities demanded. The rapid growth of ferro-alloy industry in different parts of the world has in turn led to the attainment of current carbon, alloy and special steels production targets.

These developments in ferro-alloy's production technology have, however, been exceedingly slow in their impact in India and in any case, quite disproportionately so in relation to projected developments in carbon, alloy and special steels production targets set forth in the Second and Third Five Year Plans. The ratio of alloy, tool and special steels to those of carbon steels is usually 5–15% of the latter. The corresponding figures based on 5–15% on the 10 million ingot tons of steel target per year projected at the end of the Third Five Year Plan will require output figures of $\frac{1}{2}$ to $1\frac{1}{2}$ million tons for alloy, tool and special steels which in turn will demand requisite indigenous availability and production of ferro-alloys both in terms of production figures and range of quality output. It is thus of paramount importance to establish the ferro-alloy industry in India of requisite, if not too ambitious a production capacity, covering the full range of ferro-alloys as an

adjunct to alloy steel plant or separately to meet the multi-requirements of the latter. At present, only ferro-silicon and standard high carbon grade of ferro-manganese are being commercially produced in India—beyond this there is hardly any industrial scale indigenous production of other high grade ferro-alloys. Sporadic attempts were made during the last war to produce some ferro-alloys to meet war emergencies. Substantial indigenous resources, however, exist for undertaking industrial-scale production of different types of ferro-chromium, ferro-titanium, ferro-vanadium, ferro-phosphorus, electrolytic manganese and chromium and other nitrided and/or low carbon ferro-alloys. It is in this context that emphasis on the developments of ferro-alloy industry in India has to be rightly accorded. With this end in view and in order to focus attention on the latest research and industrial developments in the wide field of ferro-alloys for the establishment of full fledged ferro-alloy industry in India that a Symposium on "Ferro-alloy Industry in India" is being organised by the National Metallurgical Laboratory wherein the engineers, metallurgists, industrialists, consumers and planners can get together, exchange technical "know-how" and appreciate inter-related problems of raw materials, processing techniques, quality and range of output and market demands facing the industry and its growth along scientific and economic lines.

Invitations are being extended to technologists, metallurgists and research scientists in India and abroad to attend the Symposium in person and contribute technical papers for discussion. The Symposium will be held early in February 1962, at the National Metallurgical Laboratory, Jamshedpur and will provide an international forum for establishing personal contacts and facilitating exchange of ideas on the development of ferro-alloy industry in general and that of India in particular.

Hanover Fair

Increased Space at 1962 Hanover Fair

The 1962 Hanover Fair is scheduled for April 29 to May 8. Last year, the Fair had 5,120 exhibitors from the German and foreign manufacturing trades who occupied 312,000 square metres of covered space and 207,000 square metres in the open air section. The expansion of the comprehensive offer and the increasingly international character of the event have been matched by a steady growth in demand by leading firms for accommodation.

At present, a two-storey hall for the chemicals and plastics industries is under construction to double the stand space available to this group at the 1962 Fair. In addition, a three-storey hall is being provided for the exhibitors of jewelry and silverware, watches and clocks, tableware and cutlery. These had formerly been housed together with the china, ceramics and glassware group in Messehaus 18. This will provide these groups with an increase of more than 50 per cent in stand space, resulting in a unique display concentration. The Exportboerse, accommodation for foreign consluar and economic representatives, has now proved too small for the demands made upon it, and will in future operate from a new International Center.

German Aviation Exhibition 1962

The Federation of the German Aviation Industry announces that, following the biennial pattern, the next German Aviation Exhibition will be held from April 29 to May 8, 1962 simultaneously with the Hanover Fair-at Hanover Airport. The Federation has again entrusted the Deutsche Messe-and Ausstellungs-AG., Hanover, with the entire arrangements. The 1962 German Aviation Exhibitation will be considerably greater in scope compared with the 1960 event.

European Textile Machinery Exhibition 1963

The committee of European Textile Machinery Manufacturers has decided to hold the 4th European Textile Machinery Exhibition on the premises of the Hanover Fair from September 22 to October 1, 1963. The last exhibition of this kind in Europe took place in Milan in 1959. The forthcoming event will provide a comprehensive review of the latest technical developments in international textile machinery.

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